



# Installation Handbook

## AutroSafe Interactive Fire Detection System



COPYRIGHT ©

This publication, or parts thereof, may not be reproduced in any form, by any method, for any purpose.

Autronica Fire and Security AS and its subsidiaries assume no responsibility for any errors that may appear in the publication, or for damages arising from the information in it. No information in this publication should be regarded as a warranty made by Autronica Fire and Security. The information in this publication may be updated without notice.

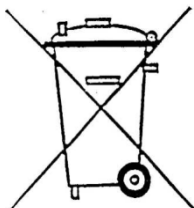
Product names mentioned in this publication may be trademarks. They are used only for identification.



This product contains static-sensitive devices. Avoid any electrostatic discharge.

The WEEE Directive

When the marking below is shown on the product and/or its literature, it means that the product should not be disposed with other household wastes at the end of its life cycle. During waste treatment, disposal and collection, please separate the product from other types of wastes and recycle it responsibly to promote the sustainable reuse of material resources. This product should not be mixed with other commercial wastes for disposal.



---

# Table of Contents

---

<b>1. Introduction.....</b>	<b>7</b>
1.1 About the Handbook.....	7
1.2 The Reader .....	7
1.3 Reference Documentation.....	8
<b>2. Pre-installation.....</b>	<b>9</b>
2.1 Location.....	9
2.2 Environmental Requirements.....	9
2.3 Mounting Height / Space Requirement .....	9
<b>3. System Units – Overview .....</b>	<b>10</b>
<b>4. Mounting Instructions .....</b>	<b>12</b>
4.1 Introduction.....	12
4.2 Mounting Fire Alarm Control Panel BS-420 / Controller BC-420 .....	13
4.3 Mounting the Operator Panel BS-430 .....	16
4.4 Mounting Repeater Panel BU-BV-420 .....	17
4.5 Mounting Power Cabinet BP-405.....	20
4.6 Mounting Power Supply Unit BPS-405 / BPS-410 .....	23
4.7 Inserting Text Foils .....	24
4.8 Cable Inlets / Outlets .....	25
4.9 Cut Out Dimensions for Flush Mounting in a Wall .....	26
4.9.1 Repeater Panel BU-BV-420 .....	26
4.9.2 Operator Panel BS-430.....	27
<b>5. Power Consumption.....</b>	<b>28</b>
5.1 Mains Power.....	28
5.1.1 BPS-405.....	28
5.1.2 BPS-410.....	28
5.2 System Units .....	28
5.3 Loop Units .....	28
5.4 Phoenix Ethernet Switches .....	29
5.5 Power Design Considerations.....	30
<b>6. Cable Connection Overview .....</b>	<b>32</b>
<b>7. Connecting Internal Cables .....</b>	<b>33</b>
7.1 Overview – BS-420 / BC-420 .....	33
7.2 BS-420 / BC-420 .....	34
7.2.1 AL_Com+ Connection on Controller Board BSA-400 .....	34
7.2.2 AL_Com+ Connection on Communication Module BSL-310 .....	34
7.2.3 Multifunction Serial Port Connection on Controller Board BSA-400 .....	35
7.2.4 Multifunction Serial Port Connection on Terminal Block, List L1.....	35

7.2.5	Multifunction Serial Port Connection Overview.....	36
7.3	Internal Earth Cabling.....	37
<b>8.</b>	<b>Connecting External Cables .....</b>	<b>38</b>
8.1	Introduction.....	38
8.2	Before Connecting Cables .....	38
8.3	Mains Wiring - Two-pole Disconnect Device.....	38
8.3.1	Voltage Selection 115/230VAC on the BPS-405.....	39
8.3.2	115/230VAC Voltage BPS-410 .....	39
8.4	AutoFieldBus Connections.....	40
8.4.1	Connections to BS-420/BC-420 - Terminal Block (List 1).....	40
8.4.2	Connections to Connector J2, Power Board BSF-400 .....	41
8.4.3	Example of the Interconnection of Several Power Cabinets .....	41
8.5	Connection of Network Cables (AutoNet) .....	42
8.5.1	AutoNet Connections – Guidelines.....	42
8.5.2	Optional Single Ethernet Connections to Panels - Guidelines .....	43
8.5.3	Connection to Controller Board BSA-400 .....	44
8.5.4	Ethernet Straight Through Cable .....	45
8.6	Common Earth Connections .....	45
8.7	RS-485 Connections to Terminal Block, List L1 .....	46
8.8	RS-422 Connections to Terminal Block, List L1 .....	46
8.9	RS-232 Connections to Terminal Block, List L1 .....	47
8.10	24V Power Connections.....	47
8.10.1	Connections to Controller Board BSA-400 .....	47
8.10.2	Connections to Power Board BSF-400 .....	48
8.10.3	Power Connection Overview.....	49
8.11	Mains Power Connections.....	50
<b>9.</b>	<b>Installing I/O Modules.....</b>	<b>51</b>
9.1	Introduction.....	51
9.2	Front View of I/O Module.....	51
9.3	Mounting / Removing I/O Modules .....	52
9.3.1	General .....	52
9.3.2	Mounting .....	52
9.3.3	Removing .....	53
9.3.4	Before Connecting Cables .....	53
9.4	Data Sheets - I/O Modules .....	53
9.5	Power Module, BSS-310A.....	54
9.6	Dual Power Monitoring Module .....	55
9.7	Redundant Power I/O Module – Circuit Diagram .....	56
9.8	Communication Module, BSL-310 .....	57
9.9	Loop Driver Module, BSD-310 / BSD-311.....	58
9.10	Output Module, Monitored, BSB-310A.....	59
9.11	Connection for FWRE on BSB-310A .....	60
9.12	Output Module, BSJ-310 (non-monitored) .....	61
9.13	Input Module, Monitored, BSE-310 .....	62
9.14	Input Module, BSE-320 (non-monitored) .....	63
<b>10.</b>	<b>Dual Safety Installation .....</b>	<b>64</b>
10.1	Dual Safety System Overview.....	64
10.2	Rules of Thumb .....	64

10.2.1	Example 1: Connections Using AL_Com+ only .....	65
10.2.2	Example 2: Connections using both AL_Com+ and AutroFieldBus.....	66
10.3	Connections Overview .....	66
10.3.1	Connections – AutoKeeper BN-180.....	68
10.3.2	Switch Settings – AutoKeeper BN-180 .....	68
<b>11.</b>	<b>Controller Board BSA 400.....</b>	<b>69</b>
11.1	Circuit Board Layout.....	69
11.2	Location inside Fire Alarm Control Panel BS-420.....	70
11.3	Description .....	70
11.4	Internal LED Indicators.....	71
11.5	Power Input Connector J18 (screw terminal).....	71
11.6	Two-stage Push Button Reset (S5).....	72
11.7	USB Ports (J10, J11).....	72
11.8	Multifunction Serial Port Connector J3 - AutroFieldBus and Fault Relay .....	73
	AutroFieldBus Connections.....	74
11.9.1	Ribbon Cable Connector BSA-400 to Terminal Block L1 .....	74
11.10	Multifunction Serial Port Dipswitch Settings – Switch S6 (RS- 232, RS-422, RS-485).....	75
11.11	Multifunction Serial Port Dipswitch Settings – Switch S7.....	75
11.12	RS-485 Connections .....	76
11.12.1	Ribbon Cable Connector BSA-400 to Terminal Block L1 ....	76
11.12.2	Switch Setting – Switch S6 and S7 .....	76
11.13	RS-422 Connections .....	76
11.13.1	Ribbon Cable Connector BSA-400 to Terminal Block L1 ....	76
11.13.2	Switch Setting – Switch S6 and S7 .....	76
11.13.3	Schematic of port equivalent: .....	77
11.14	RS-232 Connections .....	77
11.14.1	Ribbon Cable Connector BSA-400 to Terminal Block L1 ....	77
11.14.2	Switch Setting – Switch S6 and S7 .....	77
11.15	Serial Debug Connector J21 .....	78
11.16	AL_Com+ Connector J5.....	78
11.17	LCD Backlight Connector J17 .....	79
11.18	Ethernet Ports (RJ-45 Connectors).....	79
11.18.1	Ethernet Straight Through Cable .....	80
<b>12.</b>	<b>Power Supply .....</b>	<b>81</b>
12.1	Power Cabinet and Power Units .....	81
12.1.1	Power Cabinet BP-405 .....	81
12.1.2	Power Unit BPS-405 .....	81
12.1.3	Power Unit BPS-410 .....	81
12.2	Circuit Board Layout BSF-400 .....	82
12.3	Description .....	83
12.4	Power Block Diagram – Example.....	83
12.5	Batteries .....	84
12.5.1	Power Unit BPS-405 .....	84
12.5.2	Power Unit BPS-410 .....	85
12.6	Battery Charging .....	85
12.7	Button S2 – Start on S2 on Standby Source.....	87
12.8	Configuration Settings .....	88
12.9	Dipswitch table – S5 and S6 .....	89
12.10	Connectors .....	90

---

12.11	Fault Relay Watchdog J26 .....	91
12.12	Battery Resistance Measurement .....	92
12.13	Electronic fuses .....	92
12.13.1	Power outputs .....	92
12.13.2	Battery Input .....	93
12.14	Part of an AutoFieldBus Network .....	93
12.15	Power Unit BPS-405 / BPS-410 as Standalone .....	93
<b>13.</b>	<b>Cable Specifications .....</b>	<b>94</b>
13.1	Overview .....	94
13.2	Switches – Cable Length .....	96
13.2.1	Twisted Pair .....	96
13.2.2	Multi-mode Fibre .....	96
13.2.3	Single-mode Fibre .....	97
<b>14.</b>	<b>System Shielding and Earthing .....</b>	<b>98</b>
14.1	Definitions .....	98
14.2	Single Earth Systems - PowerLoop .....	99
14.3	Dual Earth Systems - PowerLoop .....	101
14.4	Shielding and Earthing AutoFieldBus .....	102
14.5	Earth Fault Detection - AutoFieldBus .....	103
14.6	Fault Finding Guidelines - Earth Faults .....	103
14.6.1	Earth Fault to Plus or Minus .....	103
14.6.2	Examples of Earth Faults .....	104
<b>15.</b>	<b>Service and Maintenance .....</b>	<b>106</b>
15.1	Fault messages Power Board BSF-400 .....	106
15.2	Service and Maintenance .....	108
15.2.1	Monthly Maintenance .....	108
15.2.2	Annual Service and Maintenance .....	109
<b>16.</b>	<b>Reader's Comments .....</b>	<b>111</b>

# 1. Introduction

## 1.1 About the Handbook

This handbook is intended to provide all necessary information for the installation of the AutoSafe Interactive Fire Detection System, Release 4. It also gives detailed information on connections to Autronica's local area network (AutoNet) and guidelines for the installation and addressing of loop units.

Information on the connection of detectors and other loop units to the detection loop is found in a separate handbook, Connecting Loop Units, 116-P-CONNECTLOOPUNIT/GBD (pdf filename connectloopunit\_gbd).



**Note that this handbook deals with the mechanical and electrical installation only. All tasks described in the handbook are to be performed without applying power to the system. Power must not be applied before commissioning, refer to Commissioning Handbook.**

The chapter «Service and Maintenance» outlines the recommended monthly and annual service and maintenance procedures that should be performed after the system has been commissioned.

## 1.2 The Reader

The handbook is intended to be used by Autronica Fire and Security trained service and technical personnel who are responsible for the installation of the AutoSafe Interactive Fire Detection System, Release 4.

## 1.3 Reference Documentation

The table below shows an overview of the technical marketing documentation for AutoSafe Interactive Fire Detection System, Release 4.

Document Name	Part number	File name
System Description	116-P-ASAFE-SYSTEMD/EGB	asafesystem_egb
Installation Handbook	116-P-ASAFE-INSTALL/DGB	asafeinstall_dgb
Commissioning Handbook	116-P-ASAFE-COMMISS/EGB	asafecommiss_egb
User Guide, Remote Access	116-P-ASAFE-REMOTEAC/EGB	asaferemoteac_egb
Connecting Loop Units	116-P-CONNECTLOOPUNIT/DGB	connectloopunit_dgb
Operator's Handbook	116-P-ASAFE-OPERATE/FGB	asafeoperate_fgb
User Guide	116-P-ASAFE-USERGUI/LGB	asafeusergui_lgb
Wall Chart	116-P-ASAFE-WALLCHA/LGB	asafewallcha_lgb
Menu Structure	116-P-ASAFE-MENUSTR/MGB	asafemenustr_mgb
Datasheet; Fire Alarm Control Panel BS-420	116-P-BS420/CGB	bs420_cgb
Datasheet; Operator Panel BS-430	116-P-BS430/CGB	bs430_cgb
Datasheet; Repeater Panel BU-BV-420	116-P-BUBV420/CGB	bubv420_cgb
Datasheet; Controller BC-420	116-P-BC420/CGB	bc420_cgb
Datasheet; Controller Unit Rack BC-440	116-P-BC440/CGB	bc440_cgb
Datasheet; Power Cabinet BP-405	116-P-BP405/CGB	bp405_cgb
Datasheet; Power Unit BPS-405	116-P-BPS405/CGB	bps405_cgb
Datasheet; Power Unit BPS-410	116-P-BPS410/CGB	bps410_cgb
Datasheet; AutoKeeper BN-180	116-P-BN180/CGB	bn180_cgb

For detailed technical information on Phoenix Ethernet Switches, refer to Phoenix Contact web site at

<http://select.phoenixcontact.com/phoenix/dwl/dwlfr1.jsp?lang=en>



## 2. Pre-installation

### 2.1 Location

The Fire Alarm Control Panel or Operator Panel must be located in, or nearby, the entrance according to local regulations and in consultation with the fire brigade.

Repeater Panels (Fire Brigade Panels and Information Panels), Controllers and Power Cabinets must be placed according to local regulations and in consultation with the fire brigade.

### 2.2 Environmental Requirements

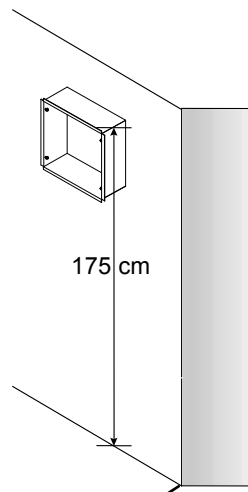
The equipment complies with environmental conditions of EN 60721-3-3:1995, class 3k5 (refer to EN 54-2, chapter 12.1.6).

Ambient temperature:  $-15^{\circ}$  to  $+70^{\circ}$  C

Degree of protection: IEC-529/IP32




### 2.3 Mounting Height / Space Requirement



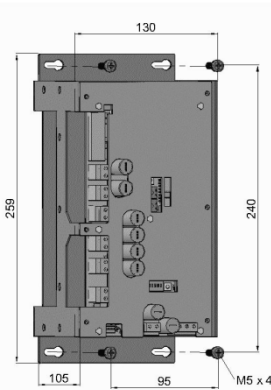
To ensure optimal readability of the Fire Alarm Control Panel's display, the recommended mounting height of this cabinet top is approximately 175 cm above the floor. Other panels should be mounted accordingly.



## 3. System Units – Overview

For detailed information on each system unit, refer to separate datasheets.

System Unit	Description
	<p><b>Fire Alarm Control Panel BS-420</b></p> <p>BS-420 is a complete fire alarm control panel with full operation capabilities. The panel serves as an operating panel for one or several defined <i>operation</i> zones. All alarm handling and system features can be controlled and monitored from the panel.</p> <p>The panel provides connections for:</p> <ul style="list-style-type: none"> <li>■ 2 Ethernet ports and 2 USB host ports</li> <li>■ 1 RS-232, RS-422 or RS-485 serial port for communication with third party equipment</li> <li>■ 1 AutoFieldBus (AFB) interface</li> <li>■ 1 ACom+ interface</li> <li>■ FailSafe relay output</li> <li>■ Power redundant</li> </ul> <p>Dimensions: HxWxD (mm): 350 x 350 x 194</p>
	<p><b>Operator Panel BS-430</b></p> <p>BS-430 serves as an operating panel for one or several defined <i>operation</i> zones.</p> <p>All alarm handling and system features can be controlled and monitored from the panel.</p> <p>Dimensions: HxWxD (mm): 350 x 350 x 84</p>
	<p><b>Repeater Panel BU-BV-420</b></p> <p>The Repeater Panel BU-BV-420 serves as both a Fire Brigade Panel and an Information Panel. Settings on a dipswitch determine the type of panel.</p> <p>The Fire Brigade Panel displays alarms and allows you to operate alarms and receive additional information related to the relevant operation zone.</p> <p>The Information Panel serves as an indication device only. It provides information related to the defined operation zone(s).</p> <p>Dimensions: HxWxD (mm): 350 x 195 x 84</p>

	<p><b>Controller BC-420</b></p> <p>The Controller, BC-420, serves as a connection unit for the detection loop, alarm sounders, controls and inputs.</p> <p>It can accommodate up to a maximum of 12 modules.</p> <p>The panel provides connections for:</p> <ul style="list-style-type: none"> <li>■ 2 Ethernet ports and 2 USB host ports</li> <li>■ 1 RS-232, RS-422 or RS-485 serial port for communication with third party equipment</li> <li>■ 1 AutoFieldBus (AFB) interface</li> <li>■ 1 AlCom+ interface</li> <li>■ FailSafe relay output</li> </ul> <p>Dimensions: HxWxD (mm): 350 x 350 x 194</p>
	<p><b>Power Cabinet BP-405</b></p> <p>The Power Cabinet BP-405 provides space for two 12V/18Ah batteries (not included). The power supply and battery brackets are already mounted when the cabinet is delivered from the factory.</p> <p>The cabinet provides:</p> <ul style="list-style-type: none"> <li>■ Power Board BSF-400, including: <ul style="list-style-type: none"> <li>■ AutoFieldBus interface</li> <li>■ 115VAC /230VAC input</li> <li>■ 6 outputs 24VDC (max. 2A each)</li> <li>■ 1 fault relay output</li> </ul> </li> </ul> <p>Dimensions: HxWxD (mm): 420 x 346 x 146</p>
	<p><b>Power Unit BPS-405 / BPS-410</b></p> <p>BPS-405: 24V/5A power supply BPS-410: 24V/10A power supply</p> <p>Both units include:</p> <ul style="list-style-type: none"> <li>■ Power Board BSF-400, including: <ul style="list-style-type: none"> <li>■ AutoFieldBus interface</li> <li>■ 115VAC /230VAC input</li> <li>■ 6 outputs 24VDC (max. 2A each)</li> <li>■ 1 fault relay output</li> </ul> </li> </ul> <p>Dimensions: HxWxD (mm): 130 x 259 x 120</p>

## 4. Mounting Instructions

---

### 4.1 Introduction

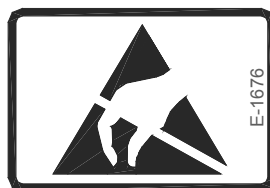
The following chapters deal with the mounting of:

- Fire Alarm Control Panel BS-420 / Controller BC-420
- Operator Panel BS-430
- Repeater Panel BU-BV-420 (Fire Brigade Panel / Information Panel)
- Power Cabinet BP-405
- Power Units BPS-405 and BPS-410

The following is delivered together with the system units:

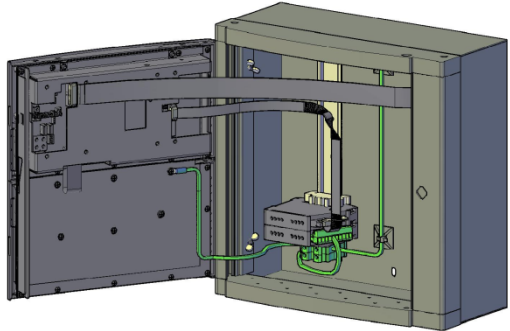
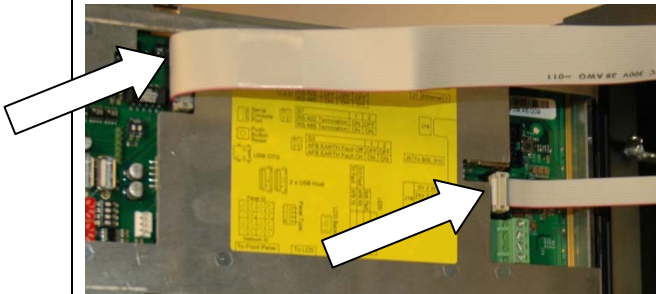

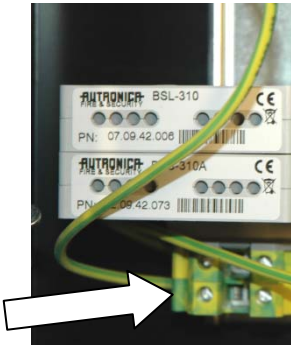
- Fireman's key (delivered with all system units, except for BC-420 and BP-405/BPS-405/BPS-410)
- Unbraco key (to lock/unlock the front panel) – (not delivered with BP-405 /BPS-405/BPS-410)
- Plastic cap to cover the key hole (Repeater Panel only; when Repeater Panel BU-BV-420 is to be used as an Information Panel)
- 11 Rubber glands for entry of external cables
- Text foils

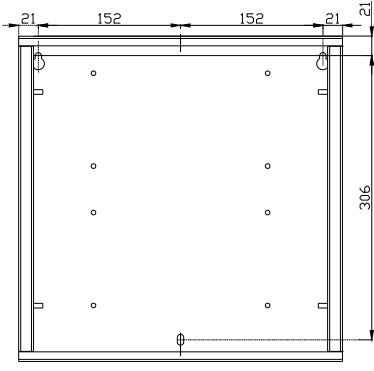
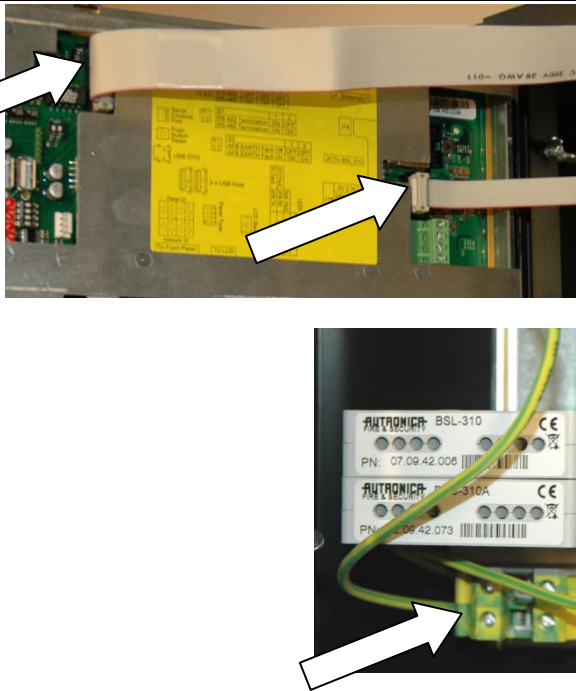
A general description of flush mounting Repeater Panel BU-BV-420 and Operator Panel BS-430 in a wall is described in a chapter 4.9.

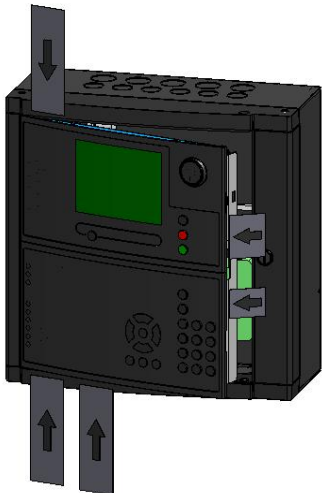


This product contains static-sensitive devices.  
Always use an antistatic wrist strap / earth bracelet to avoid any electrostatic discharge.



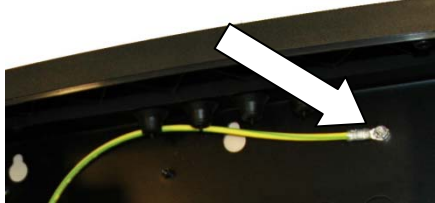
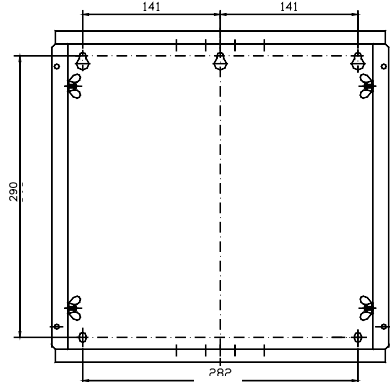
## 4.2 Mounting Fire Alarm Control Panel BS-420 / Controller BC-420

Instructions	Remarks	Illustrations
<ul style="list-style-type: none"> <li>■ Unlock the front panel by turning the unbraco key clockwise.</li> <li>■ Open the front panel.</li> </ul>	<p>In order to easily access the mounting holes when mounting the cabinet, the front panel should be removed.</p>	
<ul style="list-style-type: none"> <li>■ Disconnect both ribbon cables from the front panel.</li> </ul>		
<ul style="list-style-type: none"> <li>■ Unscrew and disconnect the earth cable from the termination block inside the cabinet.</li> </ul>	<p>Note: Do NOT unscrew the earth cable from the connection point on the front panel (PE=Protective Earth).</p> 	
<ul style="list-style-type: none"> <li>■ Unscrew the 4 wing nuts located on the right and left hand side of the cabinet, then close the front panel, and remove the front panel from the cabinet.</li> </ul>		

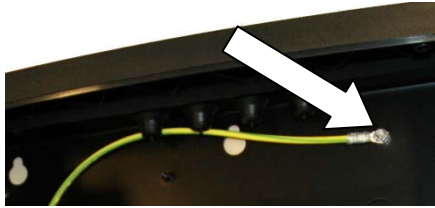
Instructions	Remarks	Illustrations
<ul style="list-style-type: none"> <li>Mark and drill the 3 holes according to the illustration.</li> </ul>	<p>The cabinet has 3 mounting holes located at the rear. The 2 upper holes are of key-hole-type.</p>	
<ul style="list-style-type: none"> <li>Partly fasten the upper screws.</li> <li>Hang the cabinet onto the upper screws.</li> <li>Partly fasten the bottom screw.</li> <li>Tighten all screws.</li> </ul>		
<ul style="list-style-type: none"> <li>Feed all the external cables into the cabinet from the top or bottom through the suitable cable inlets.</li> </ul>	<p>For detailed information on the connection of external cables, see chapter 8.</p>	
<ul style="list-style-type: none"> <li>Reassemble the front panel and tighten the 4 wing nuts.</li> </ul>		
<ul style="list-style-type: none"> <li>Reconnect the cables between the front panel and the cabinet.</li> </ul>		

Instructions	Remarks	Illustrations
<ul style="list-style-type: none"> <li>■ Insert the text foils (in the appropriate language) into their respective positions.</li> </ul>	<p>For detailed description of the various text foils, see chapter 4.7.</p>	



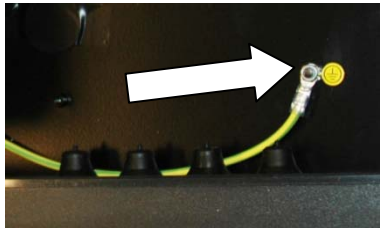
## 4.3 Mounting the Operator Panel BS-430

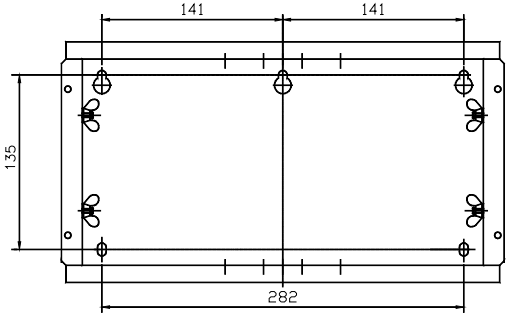
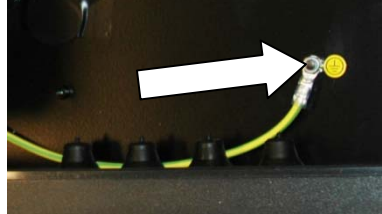
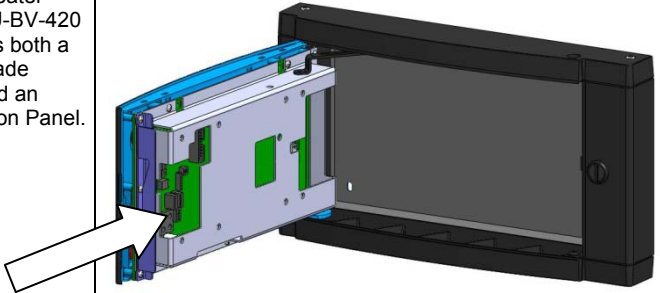
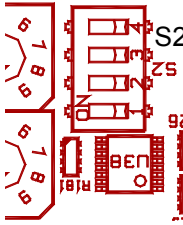
Instructions	Remarks	Illustrations
<ul style="list-style-type: none"> <li>■ Unlock the front panel by turning the unbraco key clockwise.</li> <li>■ Open the front panel.</li> </ul>	<p>In order to easily access the mounting holes when mounting the cabinet, the front panel should be removed.</p>	
<ul style="list-style-type: none"> <li>■ Unscrew and disconnect the earth cable from the termination point inside the cabinet.</li> </ul>	<p>Note: Do NOT unscrew the earth cable from the connection point on the front panel (PE=Protective Earth).</p> 	
<ul style="list-style-type: none"> <li>■ Unscrew the 4 wing nuts located on the right and left hand side of the cabinet, then close the front panel, and remove the front panel from the cabinet.</li> </ul>		
<ul style="list-style-type: none"> <li>■ Mark and drill the 3 holes.</li> </ul>	<p>The cabinet has 5 mounting holes located at the rear. The 3 upper holes are of key-hole-type.</p>	
<ul style="list-style-type: none"> <li>■ Partly fasten the upper screws.</li> <li>■ Hang the cabinet onto the upper screws.</li> <li>■ Partly fasten the bottom screw.</li> <li>■ Tighten all screws.</li> </ul>		
<ul style="list-style-type: none"> <li>■ Feed all the external cables into the cabinet</li> </ul>	<p>For detailed information on the connection of</p>	



Instructions	Remarks	Illustrations
from the top through the suitable cable inlets.	external cables, see chapter 8.	
<ul style="list-style-type: none"> <li>Reassemble the front panel and tighten the 4 wing nuts.</li> </ul>		
<ul style="list-style-type: none"> <li>Reconnect the earth cable to the termination point inside the cabinet (PE=Protective Earth).</li> </ul>		
<ul style="list-style-type: none"> <li>Insert the text foils (in the appropriate language) into the their respective positions.</li> </ul>	For detailed description of the various text foils, see chapter 4.7.	

## 4.4 Mounting Repeater Panel BU-BV-420

Instructions	Remarks	Illustrations
<ul style="list-style-type: none"> <li>Unlock the front panel by turning the unbraco key clockwise.</li> <li>Open the front panel.</li> </ul>	In order to easily access the mounting holes when mounting the cabinet, the front panel should be removed.	
<ul style="list-style-type: none"> <li>Unscrew and disconnect the earth cable from the termination point inside the cabinet.</li> </ul>	<p>Note: Do NOT unscrew the earth cable from the connection point on the front panel (PE=Protective Earth).</p> 	
<ul style="list-style-type: none"> <li>Unscrew the 4 wing nuts located on the right and left hand side of the cabinet, then close the front panel, and remove the front panel from the cabinet.</li> </ul>		

Instructions	Remarks	Illustrations
<ul style="list-style-type: none"> <li>Mark and drill all 3 holes.</li> </ul>	<p>The cabinet has 5 mounting holes located at the rear. The upper 3 holes are of key-hole-type.</p>	
<ul style="list-style-type: none"> <li>Partly fasten the upper screws.</li> <li>Hang the cabinet onto the upper screws.</li> <li>Partly fasten the bottom screw.</li> <li>Tighten all screws.</li> </ul>		
<ul style="list-style-type: none"> <li>Feed all the external cables into the cabinet from the top through the suitable cable inlets.</li> </ul>	<p>For detailed information on cable connections, see chapter 8.</p>	
<ul style="list-style-type: none"> <li>Reassemble the front panel and tighten the 4 wing nuts.</li> </ul>		
<ul style="list-style-type: none"> <li>Reconnect the earth cable to the termination point inside the cabinet (PE=Protective Earth).</li> </ul>		
<ul style="list-style-type: none"> <li>Set the appropriate dipswitch settings on dipswitch S2 (Controller Board BSA-400) according to the type of panel (either a Fire Brigade Panel or an Information Panel).</li> </ul>	<p>The Repeater Panel BU-BV-420 serves as both a Fire Brigade Panel and an Information Panel.</p>	  <p><u>Fire Brigade Panel</u>  S2-1 ON  S2-2 ON  S2-3 OFF  S2-4 OFF</p>

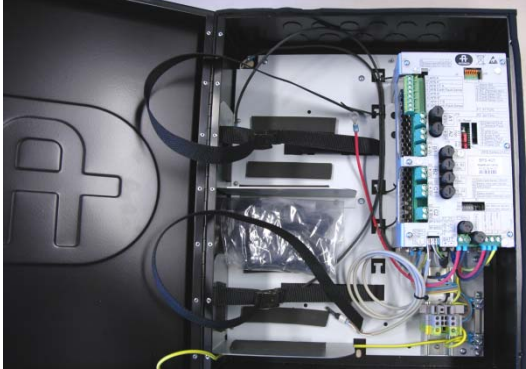
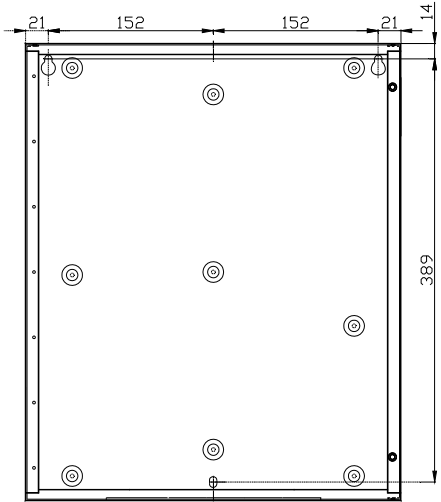
Instructions	Remarks	Illustrations
		<u>Information Panel</u> S2-1 ON S2-2 OFF S2-3 ON S2-4 OFF
<ul style="list-style-type: none"> <li>■ If the panel is to be used as an Information Panel, snap the plastic cap on top of the keyhole.</li> </ul>	<p>The Information Panel is an indication device only.</p> <p>The plastic covering is delivered together with the panel.</p>	
<ul style="list-style-type: none"> <li>■ Insert the text foils (in the appropriate language) into the their respective positions.</li> </ul>	<p>For detailed description of the various text foils, see chapter 4.7.</p>	


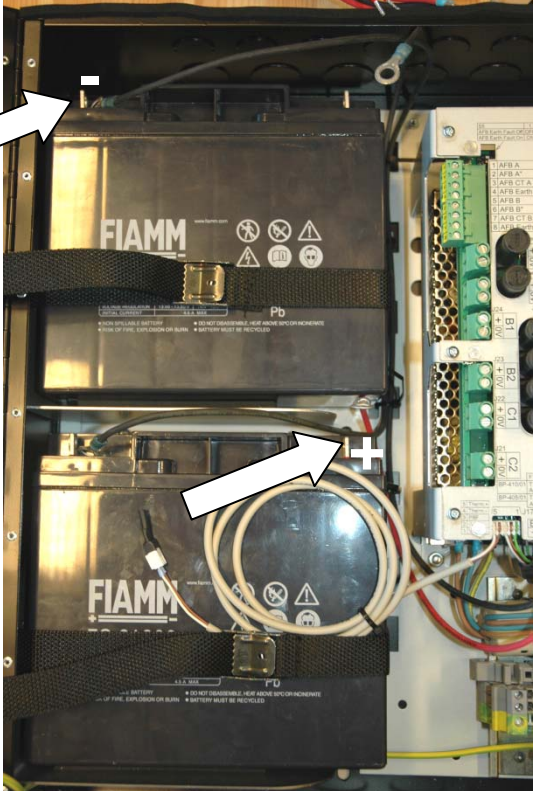
## 4.5 Mounting Power Cabinet BP-405

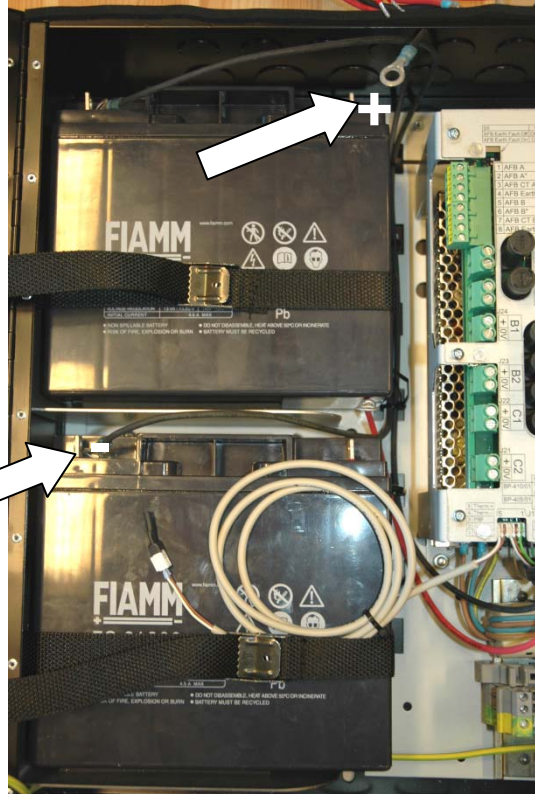
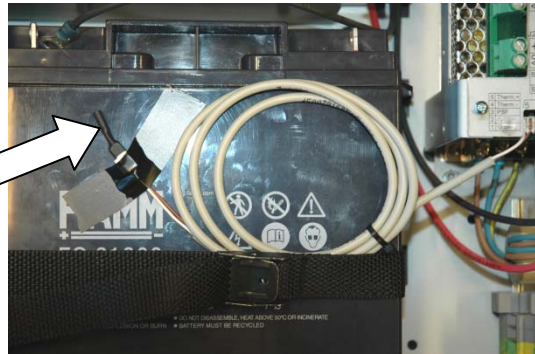
AutoSafe Release 4 provides a Power Cabinet BP-405 with space for two 12V/18Ah batteries (not included). The power supply and battery brackets are already mounted when the cabinet is delivered from the factory.

The mounting procedure deals with the mounting of the cabinet and the internal batteries.

Note that the Power Cabinet can be placed under and fastened directly to a Fire Alarm Control Panel BS-420 or a Controller BC-420. The position of the 11 cable inlets/outlets at the bottom of the BS-420/BC-420 match exactly with the ones on the top of the Power Cabinet BP-405.

Instructions	Remarks	Illustrations
<ul style="list-style-type: none"> <li>■ Unlock the front door by unscrewing the door lock screws</li> <li>■ Open the front door.</li> </ul>		
<ul style="list-style-type: none"> <li>■ Mark and drill holes.</li> </ul>	<p>The cabinet has 3 mounting holes located at the rear. The 2 upper holes are of key-hole-type.</p>	
<ul style="list-style-type: none"> <li>■ Partly fasten the upper screws.</li> <li>■ Hang the cabinet onto the upper screws.</li> <li>■ Partly fasten the bottom screw.</li> <li>■ Tighten all screws.</li> </ul>		

Instructions	Remarks	Illustrations
<ul style="list-style-type: none"> <li>■ Insert both batteries in their appropriate locations with the battery poles facing up and towards the outside of the cabinet.</li> <li>■ Tighten the strap around each battery.</li> </ul>		
<ul style="list-style-type: none"> <li>■ Connect the black cable from the connector on the Power Board to the minus pole on the uppermost battery.</li> <li>■ Connect the red cable from the connector on the Power Board to the plus pole on the lowermost battery.</li> </ul>	<p>Make sure that the correct black cable is connected to the minus pole, i.e. the one that is connected to the Power Board on the other end.</p>	

Instructions	Remarks	Illustrations
<ul style="list-style-type: none"> <li>Interconnect the other plus pole and minus pole on the batteries with the cable.</li> </ul>		
<ul style="list-style-type: none"> <li>Locate the wire (Part No. 116-XL-069) connected to the Power Board (Therm + and Therm-), then fasten the temperature sensor on the other end of the cable to the battery with a piece of tape.</li> </ul>	<p>Make sure that the sensor itself is securely fastened close to the battery.</p> <p>The length of the temperature sensor wire must not exceed 3m. Make sure that the wire is not placed close to other wires that conduct high current, as for example, wires for sounder circuits, 230VAC or 24VDC.</p>	

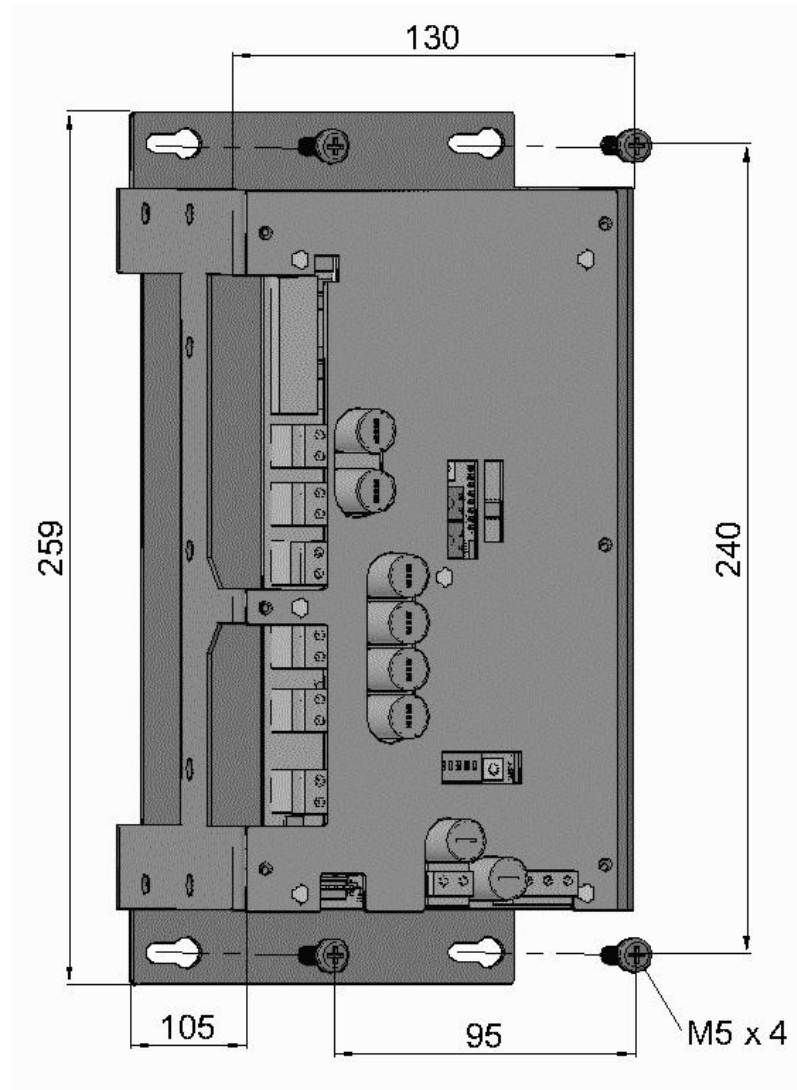


## 4.6 Mounting Power Supply Unit BPS-405 / BPS-410

The unit can be mounted inside a rack or consol. The hole and screw dimensions are shown below.

Note that the BPS-410 Power Supply Unit 24VDC/10A is delivered as two separate part numbers:

- 116-BPS-410 for 230VAC
- 116-BPS-410/115 for 115VAC



The dipswitch settings on the Power Board BSF-400 (dipswitch S6-6) determines the type of power unit.

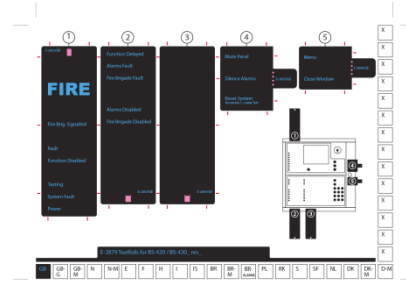
Dip-switch	Name	Description
S6-6	Power Unit Type	ON: BPS-405 OFF: BPS-410

For further information on dipswitch settings, refer to chapter 12.9. Note that when using Power Unit BPS-410 (including a 24V/10A power supply), a calibration procedure must be performed. Refer to the Commissioning Handbook, Calibration Procedure – Power Unit BPS-410.

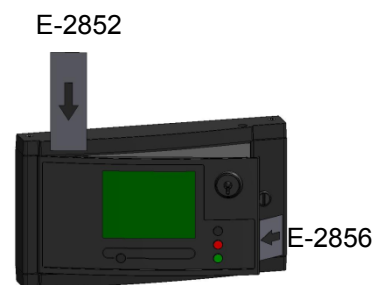
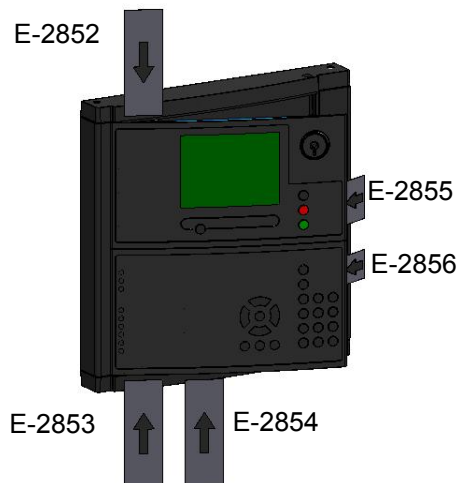
## 4.7 Inserting Text Foils

- Find the text foils in the relevant language for the panel in question (foil sheets are delivered with the panel).

The part numbers are indicated below.

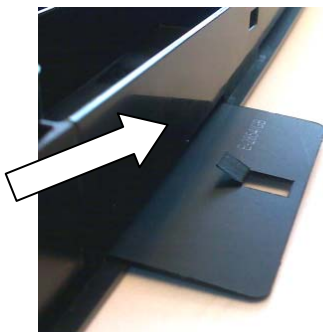


Example: Foil sheet for BS-420



- Make sure that you are holding the textfoil the correct way.
- Bend the small flap towards the panel (as shown on the left most illustration below), then insert the foil into the appropriate slot, and slightly push it in as far as possible.
- The foils that are to be inserted into the slot on the right hand side of the panel front have a small flap which can easily be bent (along the perforation holes).

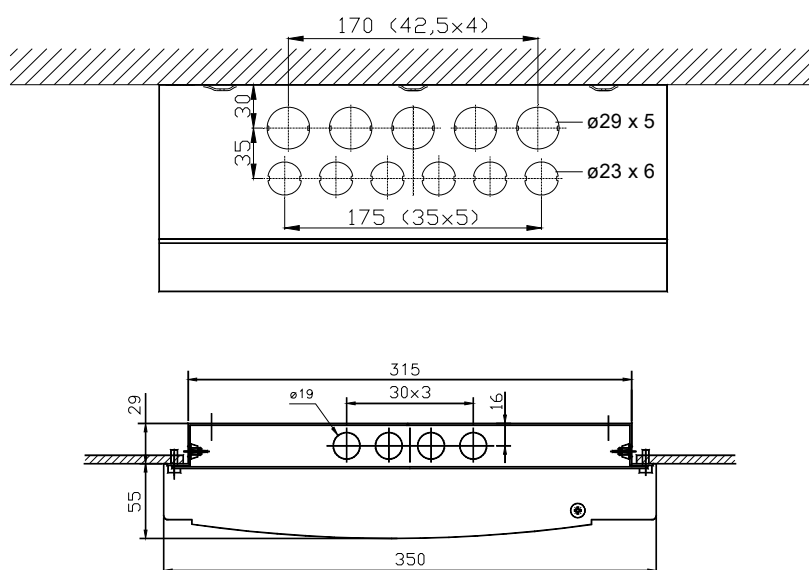
Fire Alarm Control Panel BS-420 is shown in the example below.





## 4.8 Cable Inlets / Outlets

When feeding the cables, use whichever is appropriate.



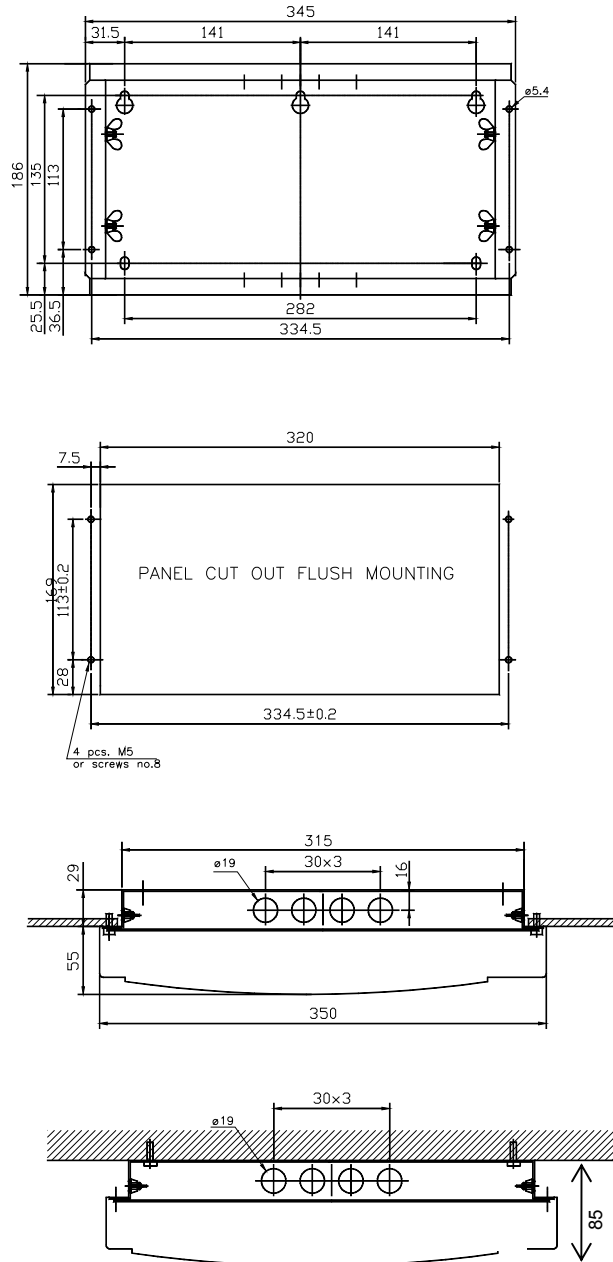
The illustration above shows the positioning and dimensions of the cable inlets for BS-420/BC-420 (the uppermost illustration) and BU-BV-420.

## 4.9 Cut Out Dimensions for Flush Mounting in a Wall

The Repeater Panel BU-BV-420 and Operator Panel BS-430 can be flush mounted in a wall.

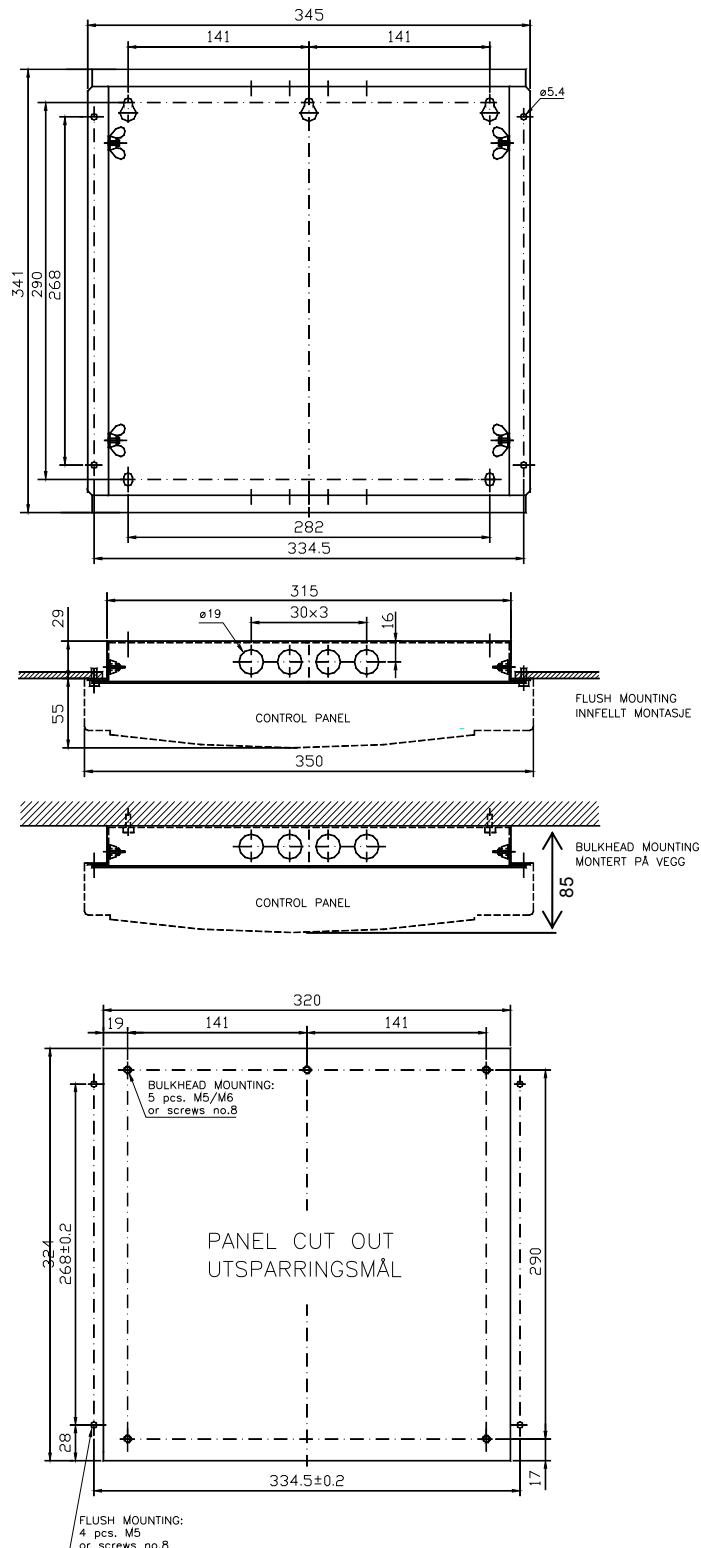
### 4.9.1 Repeater Panel BU-BV-420

The illustration below shows the cabinet's cut out dimensions. The dimensions given include space for the cover frame.



## 4.9.2 Operator Panel BS-430

The illustration below shows the cabinet's cut out dimensions. The dimensions given include space for the cover frame.



## 5. Power Consumption

---

### 5.1 Mains Power

#### 5.1.1 BPS-405

The current consumption at 115V AC is 3,2A.  
The current consumption at 230V AC is 1,6A.

The inrush peak current consumption is 35A.

#### 5.1.2 BPS-410

The current consumption at 115V AC is 4,5A.  
The current consumption at 230V AC is 1,9A.

The inrush peak current consumption is 35A.

### 5.2 System Units

System Unit	Current Consumption
Fire Alarm Control Panel BS-420 Controller BC-420	156mA/27V DC (idle) Max. 340mA/27V DC
Repeater Panel BU-BV-420	156mA/22,2V DC (idle) Max. 220mA/27V DC (lamp test)
Operator Panel BS-430	175mA/27V DC (idle) Max. 340mA/27V DC (lamp test)
Power Board BSF-400	85mA

### 5.3 Loop Units

For information on the current consumption for various loop units, refer to technical specifications provided in the relevant datasheets.

## 5.4 Phoenix Ethernet Switches

A network solution (AutoNet) with more than two panels requires the use of switches. Only Phoenix Ethernet switches (see table below) are approved and supported by Autronica Fire and Security AS. The switch type and the number of switches depend on the actual installation / network design (number of panels and the transmission length between the panels / switches). The current consumption for each Phoenix switch is shown below.

SFNT: Standard Function Narrow High Temperature Unmanaged Switches

LM: Lean Managed Switches

Note:

All Ethernet switches can be used for the Onshore market. Only Ethernet switches that are indicated in coloured rows (the first 9 that are listed) can be used for the Maritime market and the Petrochemical Oil & Gas market.

Switch type (Phoenix)	Description	Autronica part number	Current Consumption (max.) @ 24V DC
FL SWITCH SFNT 5TX	5 RJ45 ports	116-5151-030.2127	120mA
FL SWITCH SFNT 4TX/FX	4 RJ45 ports 1 fibre optic multi-mode port (SC)	116-5151-030.2128	160mA
FL SWITCH SFNT 8TX	8 RJ45 ports	116-5151-030.2129	153mA
FL SWITCH SFNT 7TX/FX	7 RJ45 ports 1 fibre optic multi-mode port (SC)	116-5151-030.2130	175mA
FL SWITCH LM 5TX	5 RJ45 ports	116-5151-030.2131	250 mA
FL SWITCH LM 4TX/FX	4 RJ45 ports 1 fibre optic multi-mode port (SC)	116-5151-030.2132	380mA
FL SWITCH LM 4TX/2FX	4 RJ45 ports 2 fibre optic multi-mode ports (SC)	116-5151-030.2133	400mA
FL SWITCH LM 4TX/FX SM	4 RJ45 ports 1 fibre optic single-mode port (SC)	116-5151-030.2134	380mA
FL SWITCH LM 4TX/2FX SM	4 RJ45 ports 2 fibre optic single-mode ports (SC)	116-5151-030.2135	400mA
FL SWITCH SFNB 5TX	5 RJ45 ports	116-5151-030.2136	180mA
FL SWITCH SFNB 8TX	8 RJ45 ports	116-5151-030.2137	138mA
FL SWITCH SFN 4TX/FX	4 RJ45 ports 1 fibre optic multi-mode port (SC)	116-5151-030.2138	140mA
FL SWITCH SFN 7TX/FX	7 RJ45 ports 1 fibre optic multi-mode port (SC)	116-5151-030.2139	190mA
FL SWITCH SFN 6TX/2FX	6 RJ45 ports 2 fibre optic multi-mode ports (SC)	116-5151-030.2140	230mA
FL SWITCH SFNB 4TX/FX SM 20	4 RJ45 ports 1 fibre optic single-mode port (SC)	116-5151-030.2142	175mA

For detailed technical information on Phoenix Ethernet Switches, refer to Phoenix Contact web site at

<http://select.phoenixcontact.com/phoenix/dwl/dwlfr1.jsp?lang=en>

## 5.5 Power Design Considerations

The Power Cabinet's (BP-405) power supply (BPS-405) has 3A available, as 2A is reserved for battery charging.

The supplies have three different output classes:

- A1/A2, rated 2A each. (May be paralleled for higher current). Will always be ON except in fault situations.
- B1/B2, rated 2A each. (May be paralleled for higher current)
- C1/C2, rated 2A each. (May NOT be paralleled. Will be turned OFF during every start-up/initialization).

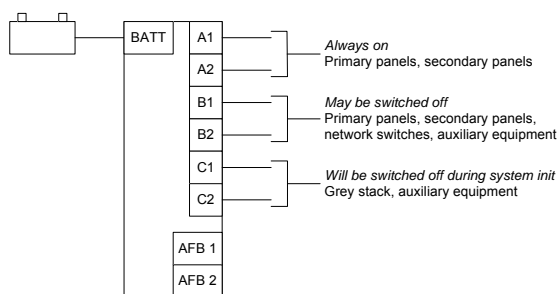
Only supplies with output class A may be paralleled with each other. This also applies to supplies with output class B.

The outputs current is limited by the total available current, i.e. on a BP-405 Power Cabinet with battery, 2A is drawn from output A1, only 1A is available from output A2, and nothing available for the other outputs.

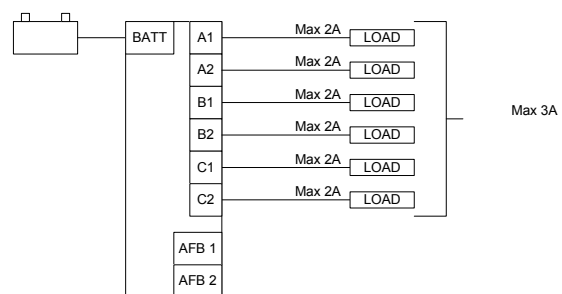
One BPS-405 unit can be connected to one battery set. A battery set may NOT be shared by several BPS-405 units.

The outputs from different BPS-405 units may NOT be paralleled, as the power supplies are not designed for this. Earth fail detection will also fail. Regulations define that battery resistance shall be monitored, which prevents the use of common battery bank.

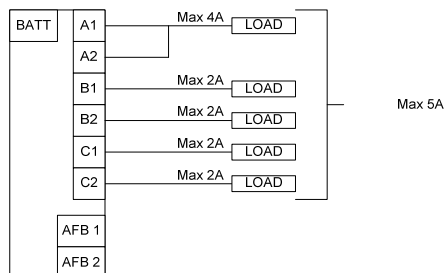
The A1/A2 outputs are guaranteed to stay active in case of a BPS-405 software failure. If one output (for example, A1) is short circuited, the other ones are not affected. This does not apply when two outputs are paralleled, (for example, A1 and A2), as a short circuit in this case will bring down both outputs.



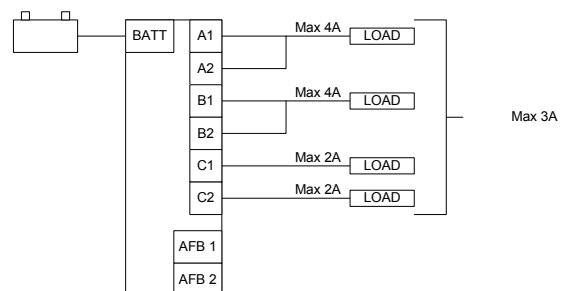
Basic configuration



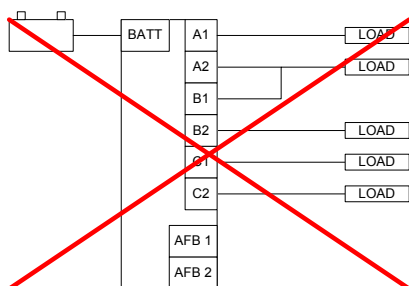
Basic configuration



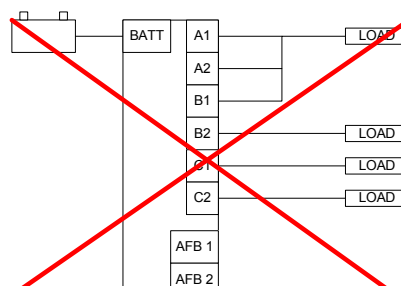
No battery increases available current output



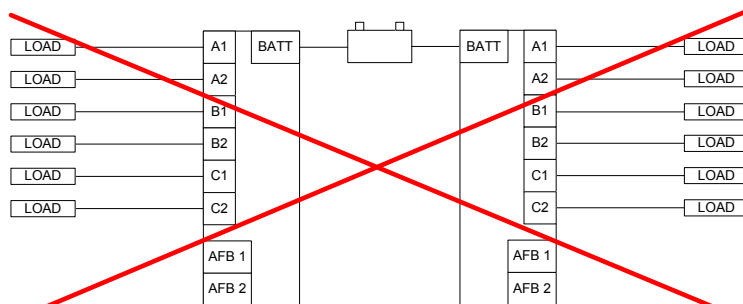
Outputs with same letter may be paralleled



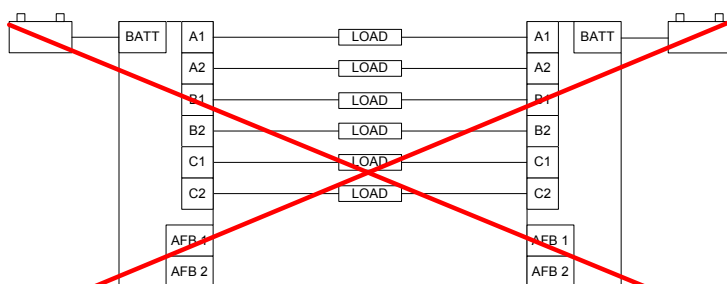
Different output classes shall not be paralleled



Different output classes shall not be paralleled

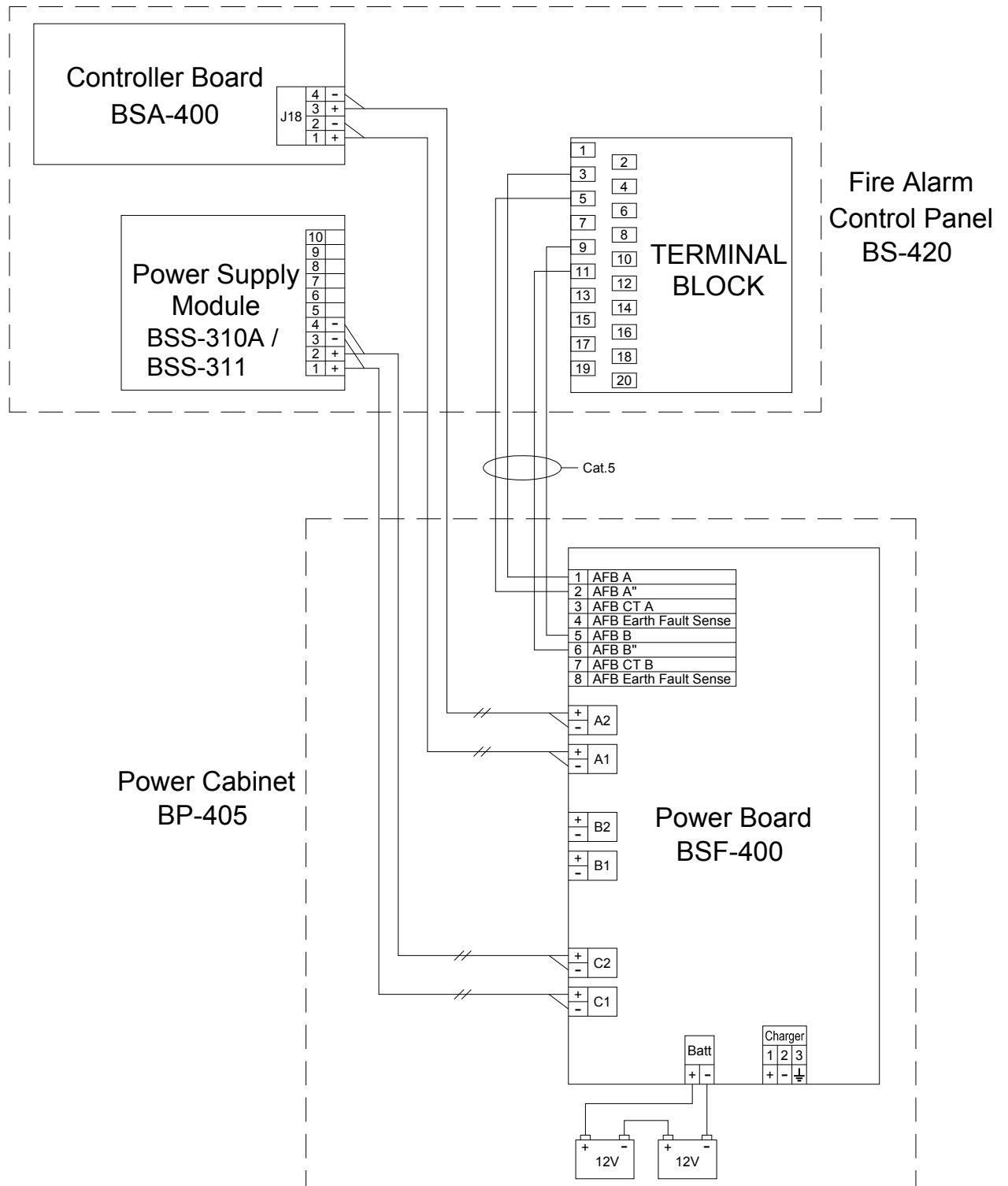


Do not share batteries



Do not connect outputs from different power modules

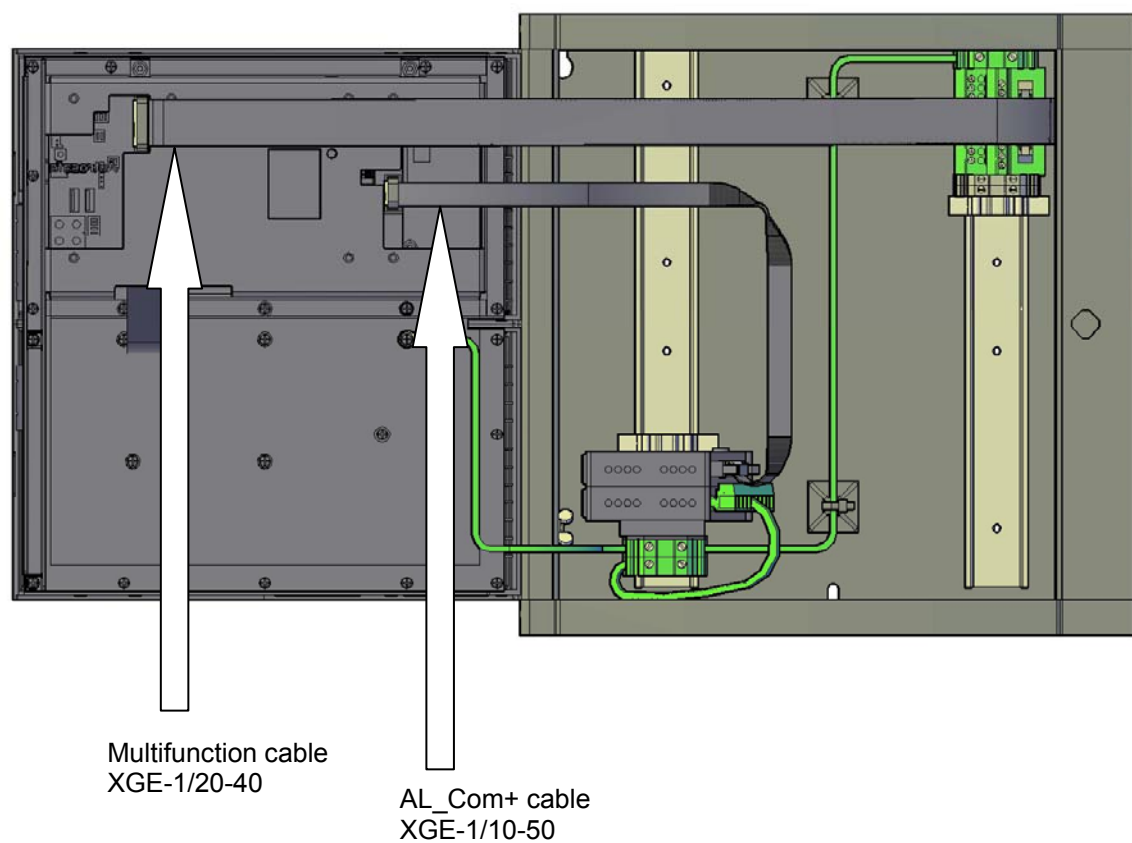
## 6. Cable Connection Overview





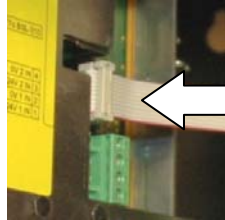
## 7. Connecting Internal Cables

### 7.1 Overview – BS-420 / BC-420



## 7.2 BS-420 / BC-420

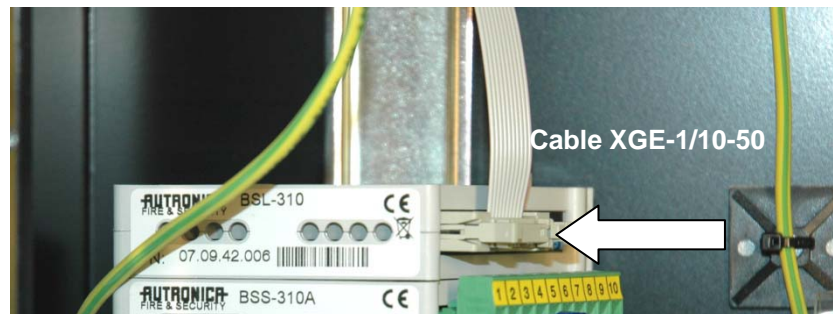
### 7.2.1 AL\_Com+ Connection on Controller Board BSA-400



Connector J5  
Cable XGE-1/10-50

Connector J5	Description	
J5.1	AL_Com+ CTS	The other end of the ribbon cable is connected to Communication Module BSL-310 inside the cabinet (see chapter 9.8)
J5.2	0VIN	
J5.3	AL_Com+ RXD	
J5.4	0VIN	
J5.5	Not Connected	
J5.6	0VIN	
J5.7	AL_Com+ TXD	
J5.8	0VIN	
J5.9	AL_Com+ RTS	
J5.10	0VIN	

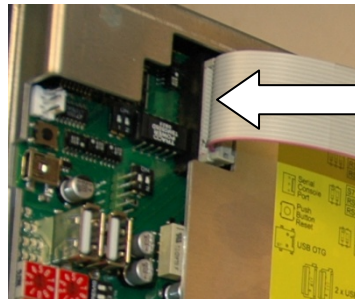
### 7.2.2 AL\_Com+ Connection on Communication Module BSL-310



For detailed information on the module's termination points, refer to chapter 9.8.

### 7.2.3 Multifunction Serial Port Connection on Controller Board BSA-400

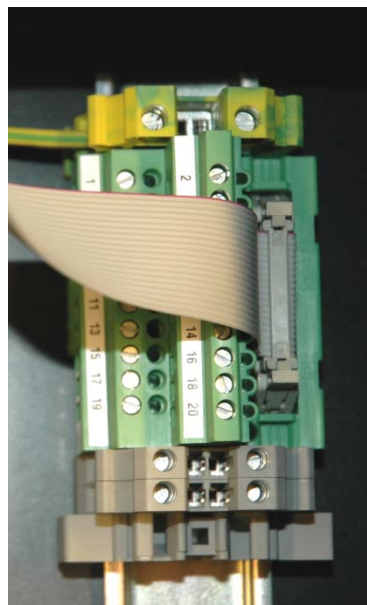
A ribbon cable is connected between the Multifunction Serial Port Connector and the main terminal block (mounted on the DIN rail inside the cabinet). For detailed information, refer to chapter 11.8.



Connector J3  
Multifunction cable XGE-1/20-40

### 7.2.4 Multifunction Serial Port Connection on Terminal Block, List L1

The ribbon cable from the Serial Port Connection on the Controller Board is connected to the main terminal block, list L1 (mounted on the DIN rail inside the cabinet).

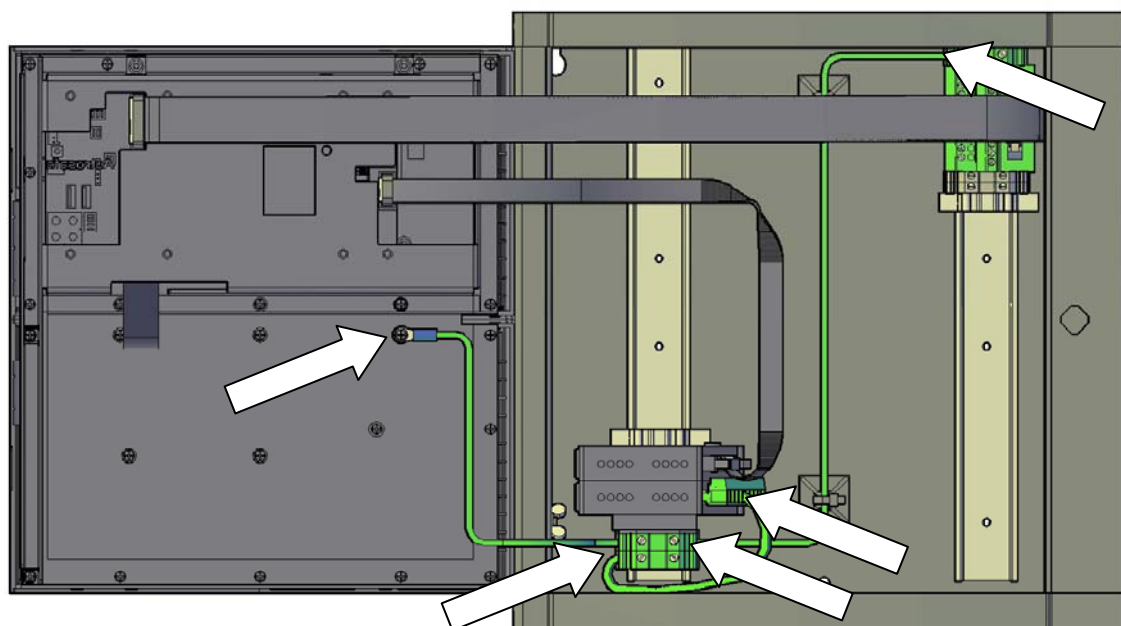


Multifunction cable  
XGE-1/20-40

## 7.2.5 Multifunction Serial Port Connection Overview

Connection to terminal block (L1)	Description	Connector J3 on Controller Board BSA-400
L1.1	GND	J3.1
L1.2	GND	J3.2
L1.3	AutroFieldBus B	J3.3
L1.4	Multifunction Serial Port RS-422/RS485 A+	J3.4
L1.5	AutroFieldBus B'	J3.5
L1.6	Multifunction Serial Port RS-422/RS485 B-	J3.6
L1.7	AutroFieldBus B Reference	J3.7
L1.8	Multifunction Serial Port RS-422 X+	J3.8
L1.9	AutroFieldBus A	J3.9
L1.10	Multifunction Serial Port RS-422 Z+	J3.10
L1.11	AutroFieldBus A'	J3.11
L1.12	Multifunction Serial Port RS-232 TX	J3.12
L1.13	AutroFieldBus A Reference	J3.13
L1.14	Multifunction Serial Port RS-232 RX	J3.14
L1.15	GND	J3.15
L1.16	Multifunction Serial Port Reference	J3.16
L1.17	Fault Relay Normal Open	J3.17
L1.18	GND	J3.18
L1.19	Fault Relay Normal Closed	J3.19
L1.20	Fault Relay Common	J3.20

## 7.3 Internal Earth Cabling



## 8. Connecting External Cables

---

### 8.1 Introduction

This chapter deals with the connection of external cables. For information on the connection of detection loops, refer to chapter 9.9.

For more detailed information regarding the Controller Board BSA-400 and Power Board BSF-400, see chapter 11 and 12, respectively.

### 8.2 Before Connecting Cables



**POWER OFF!**

- Before connecting cables, make sure that the mains power is *not* connected.
- Remove fuse F8 from the power supply in all Power Cabinets (see chapter 8.10.2).  
Do not replace the fuse until commissioning of the system. Refer to the Commissioning Handbook.

### 8.3 Mains Wiring - Two-pole Disconnect Device

In the fixed mains wiring to the panel a two-pole disconnect device must be provided to disconnect the equipment from the power supply when servicing is required. Normally, this switch is a two-pole automatic fuse located in the fuse terminal box at the premises. This fuse location must be marked "Fire Alarm System".

The isolation of the mains wiring must be of either:

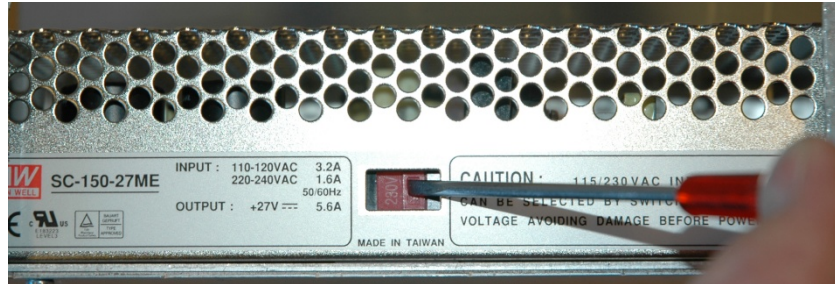
- inflammability class V2  
or
- the wiring has to be fixed to the cabinet separated from all other cables

### 8.3.1 Voltage Selection 115/230VAC on the BPS-405



**POWER OFF!**

- Make sure that the mains power is *not* connected.
- Use a screwdriver to slide the switch to the correct position according to the appropriate voltage (115/230VAC).



### 8.3.2 115/230VAC Voltage BPS-410



**POWER OFF!**

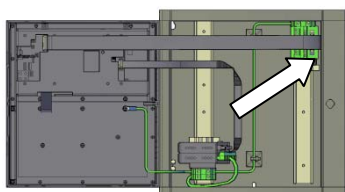
- Note:  
The BPS-410 Power Unit 24VDC/10A is delivered as two separate part numbers:
- 116-BPS-410 for 230VAC
  - 116-BPS-410/115 for 115VAC

- Make sure to use the correct unit according to the appropriate voltage (115/230VAC).

## 8.4 AutoFieldBus Connections

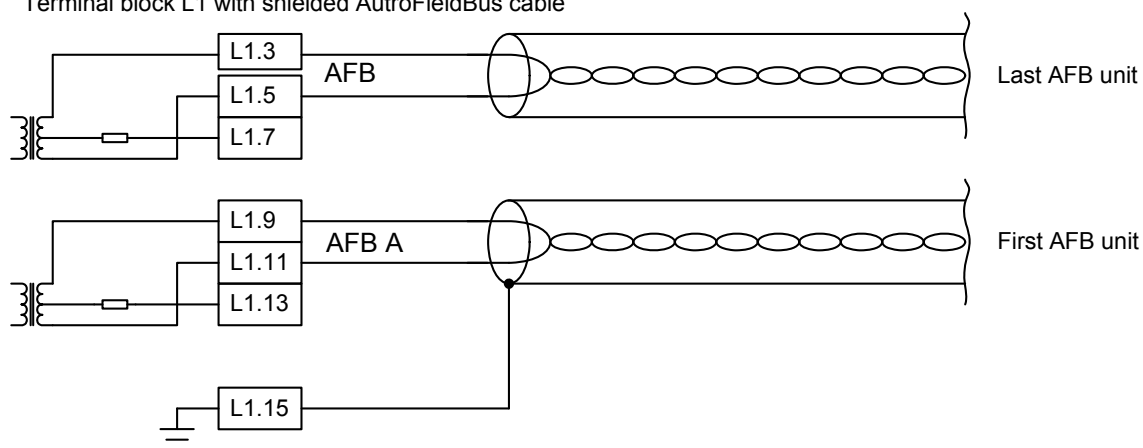
### 8.4.1 Connections to BS-420/BC-420 - Terminal Block (List 1)

Shielded cable required.



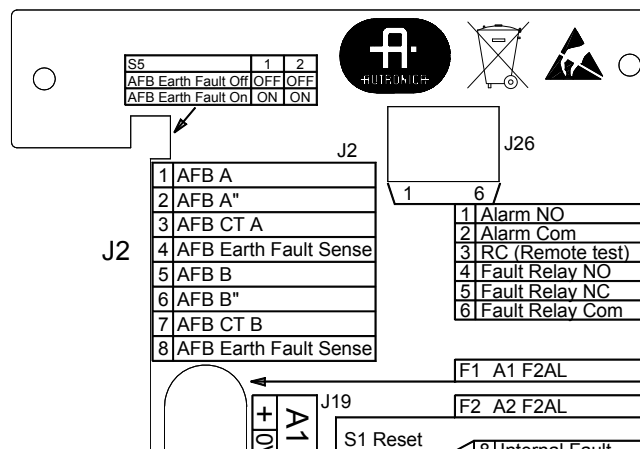
Terminal	Function
L1.9	AutoFieldBus A
L1.11	AutoFieldBus A'
L1.13	AutoFieldBus CT A
L1.3	AutoFieldBus B
L1.5	AutoFieldBus B'
L1.7	AutoFieldBus CT B
L1.15	Earth

Terminal block L1 with shielded AutoFieldBus cable





### 8.4.2 Connections to Connector J2, Power Board BSF-400

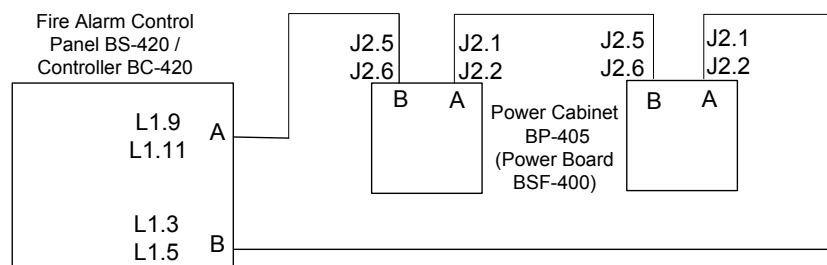


The table below shows the connections between a Power Board BSF-400 and a BS-420/BC-420 when only one Power Board BSF-400 (inside the Power Cabinet BP-405) is used (i.e. the connections to and from one single Power Cabinet BP-405).

Connector J2 Power Board BSF-400	Terminal block, List L1, inside BS-420/BC-420
J2.1 (AFB A)	L1.3 (AFB B)
J2.2 (AFB A')	L1.5 (AFB B')
J2.5 (AFB B)	L1.9 (AFB A)
J2.6 (AFB B')	L1.11 (AFB A')

### 8.4.3 Example of the Interconnection of Several Power Cabinets

The example below shows the interconnection of two Power Cabinets on the AutoFieldBus. Note that the AutoFieldBus always goes from AFB A on the main terminal block inside BS-420/BC-420 to AFB B on the J2 connector on the Power Board BSF-400, then from AFB A to the next unit. The cable finally returns to AFB B on the main terminal block.

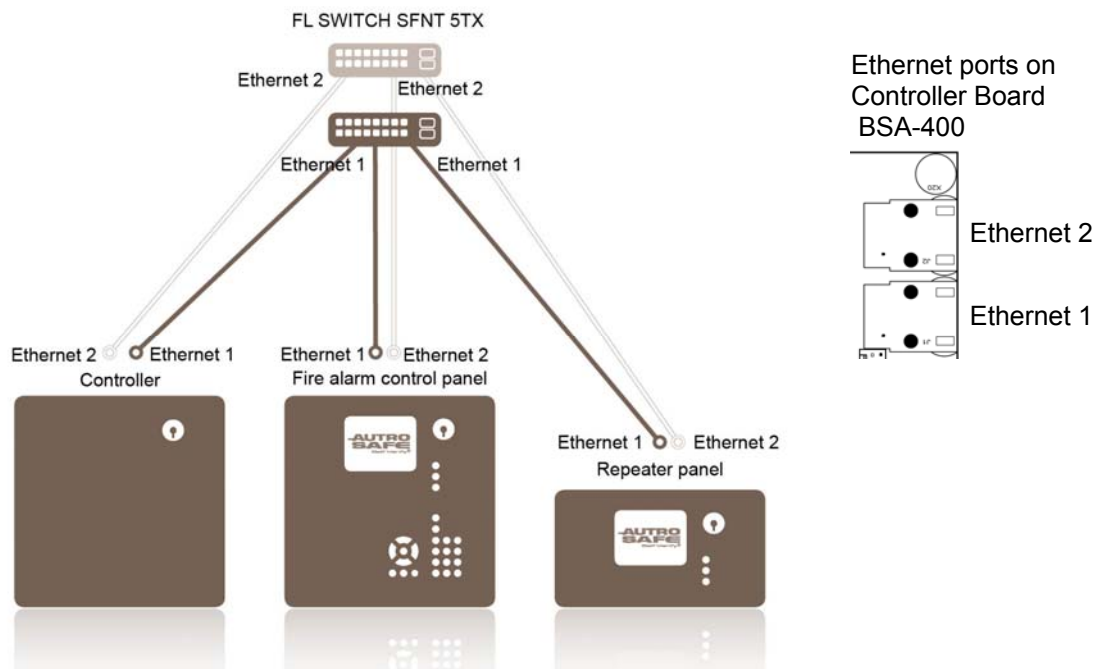


## 8.5 Connection of Network Cables (AutoNet)

### 8.5.1 AutoNet Connections – Guidelines

Each panel provides two ports; Ethernet 1 and Ethernet 2 (see chapter 8.5.3). The illustration below shows an *example* of the fully redundant standard AutoNet, where the following guidelines apply:

- Connect the Ethernet cables for Ethernet 1 to and from the connections labeled Ethernet 1 (panels and Ethernet switches) throughout the entire system.
- Connect the Ethernet cables for Ethernet 2 to and from the connections labeled Ethernet 2 (panels and Ethernet switches) throughout the entire system.

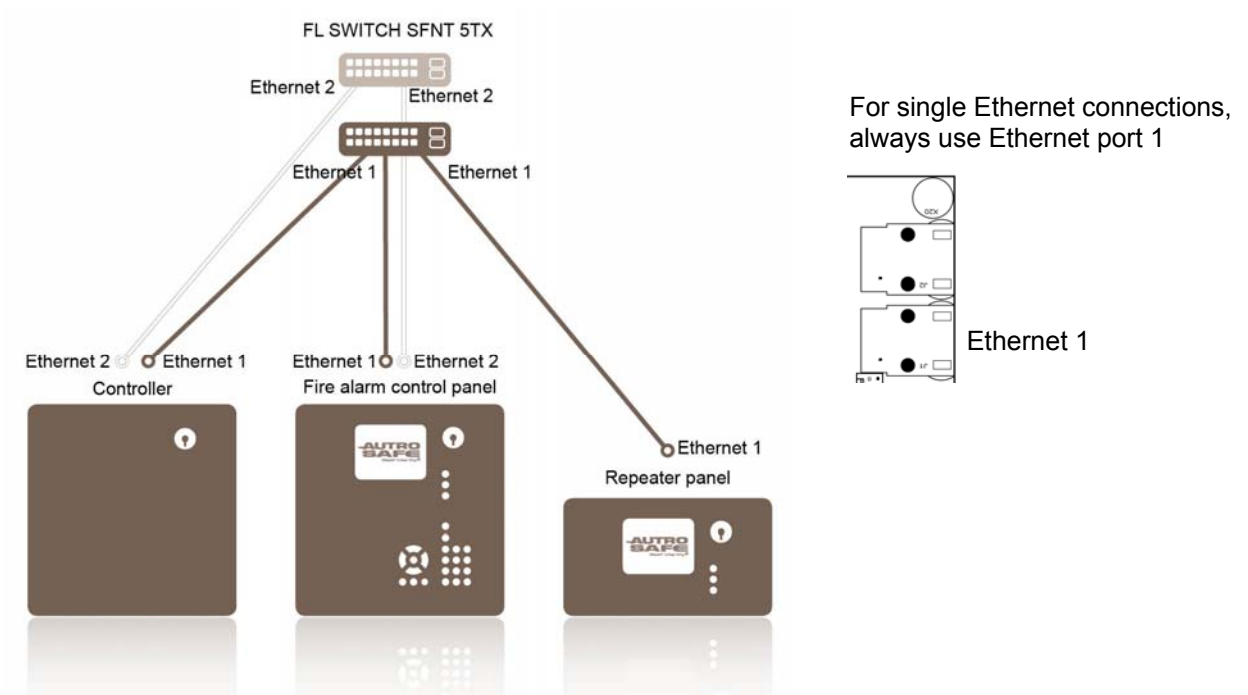


## 8.5.2 Optional Single Ethernet Connections to Panels - Guidelines

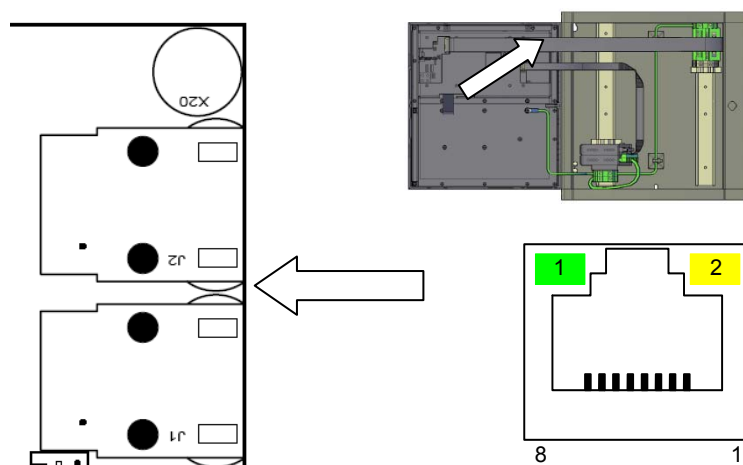
As an option, AutoSafe 4 allows also single Ethernet connections to one or several panels in a system if redundancy is not required. Ethernet 1 must always be used for single Ethernet connections.

The *example* below is similar to the one above (chapter 8.5.1); all panels have redundant connections to the system, except for the Repeater Panel, which has a single Ethernet connection.

- Between the Repeater Panel and the Ethernet switch, make only a single Ethernet connection to and from Ethernet 1.
- Connect the remaining Ethernet cables as described in chapter 8.5.1



### 8.5.3 Connection to Controller Board BSA-400

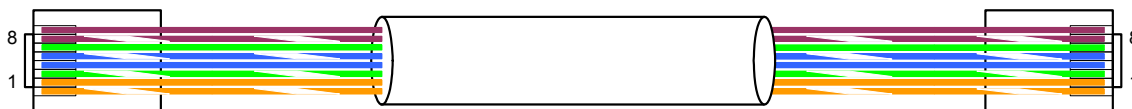


The BSA-400 board on all panels provides two separate 10/100Mbit Ethernet ports. The connector is an RJ-45 modular jack, suitable for shielded cable CAT5 which allows cable lengths up to 100m (see Cable Specifications, chapter 13).

Connector	Connector	Description
J1.1	J2.1	TX+, Transmit Data+
J1.2	J2.2	TX-, Transmit Data-
J1.3	J2.3	RX+, Receive Data+
J1.4	J2.4	N.C.
J1.5	J2.5	N.C.
J1.6	J2.6	RX-, Receive Data-
J1.7	J2.7	N.C.
J1.8	J2.8	N.C.

LED 1	Activity LED
LED 2	If ON, 100MBit/s, if OFF, 10MBit/s

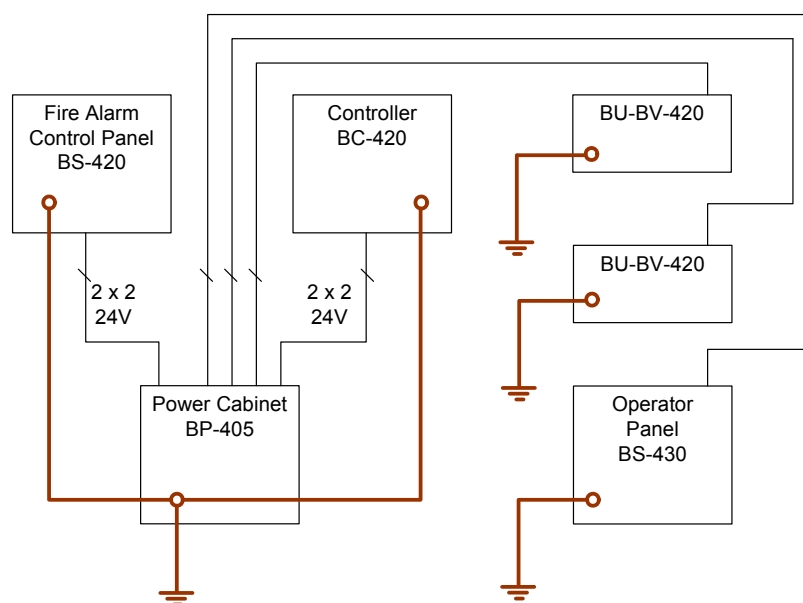
### 8.5.4 Ethernet Straight Through Cable



Name	Pin		Cable Color	Pin	Name
TX+	1		White/Orange	1	TX+
TX-	2		Orange	2	TX-
RX+	3		White/Green	3	RX+
	4		Blue	4	
	5		White/Blue	5	
RX-	6		Green	6	RX-
	7		White/Brown	7	
	8		Brown	8	

## 8.6 Common Earth Connections

All panels must be connected to a common earth for EMC compliance.

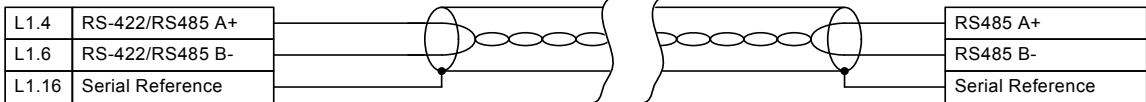


Shielded or armoured cable must be used for the 24V DC power supply.

## 8.7 RS-485 Connections to Terminal Block, List L1

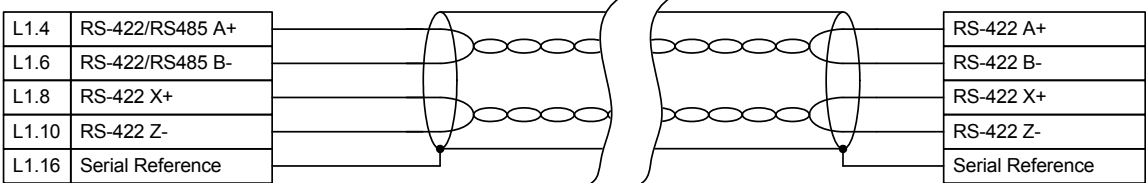
Twisted pair, shielded cable is required.  
Maximum 100Ω resistive loss.  
Maximum total length 1200m.  
Maximum cable capacitance 150 nF.

Terminal block list L1  
RS-485

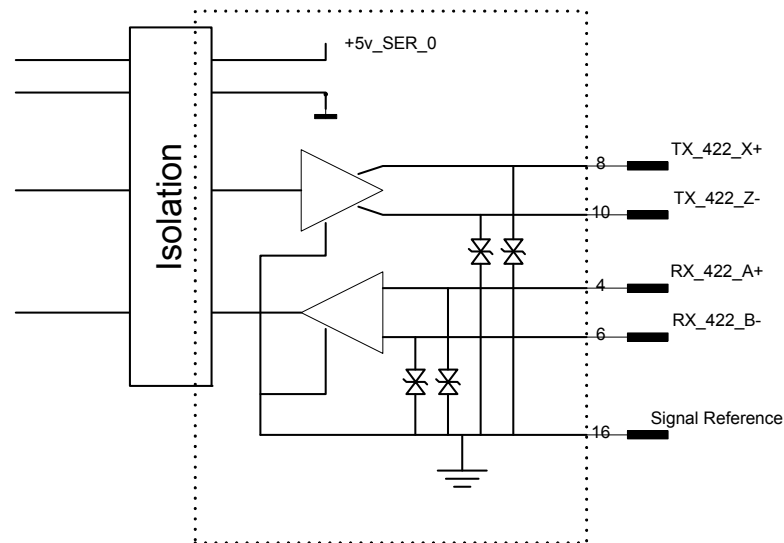


## 8.8 RS-422 Connections to Terminal Block, List L1

Terminal block list L1  
RS-422



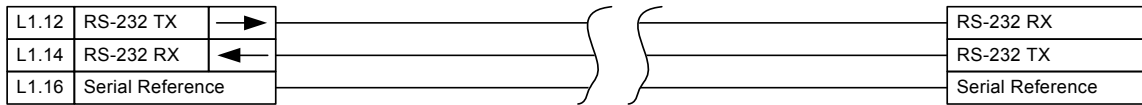
Schematic of port equivalent:



The protection shown in the schematic of port equivalent above is made for 1kV High Energy Surge. In addition, the connection is protected against wrong connections between Serial Reference and other signals for voltage up to 29V DC.

## 8.9 RS-232 Connections to Terminal Block, List L1

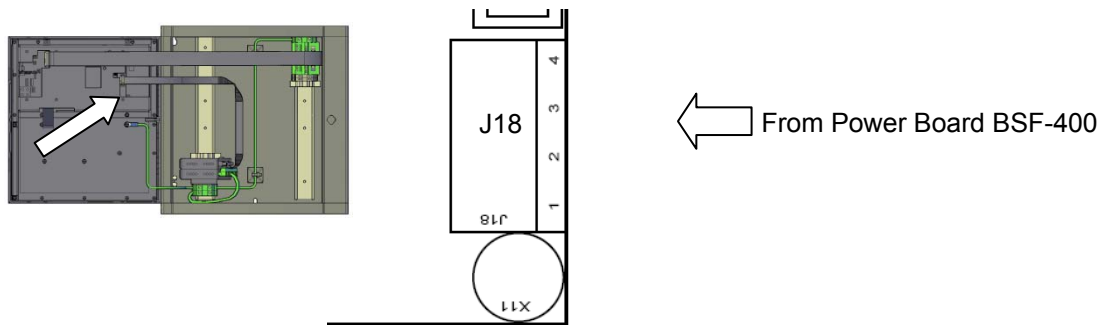
Terminal block list L1  
RS-232



## 8.10 24V Power Connections

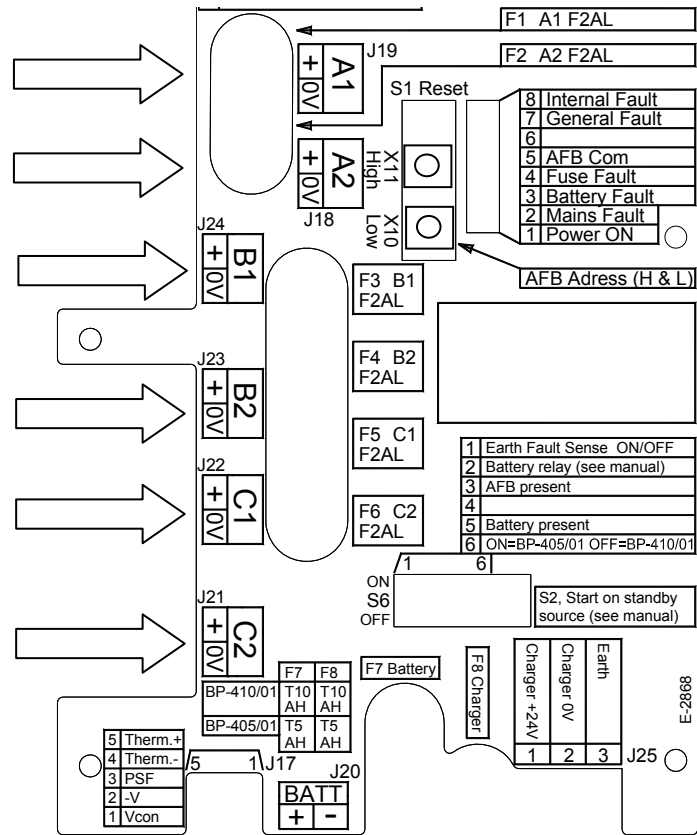
### 8.10.1 Connections to Controller Board BSA-400

24V power is supplied to connector J18 on the Controller Board BSA-400 on all panels.



Connector J18 on Controller Board BSA-400	Description		Connections to Power Board BSF-400
J18.1	+24V In 1	Interconnection	A1 +
J18.2	0V In 1		A1 0V
J18.3	+24V In 2		A2 +
J18.4	0V In 2		A2 0V

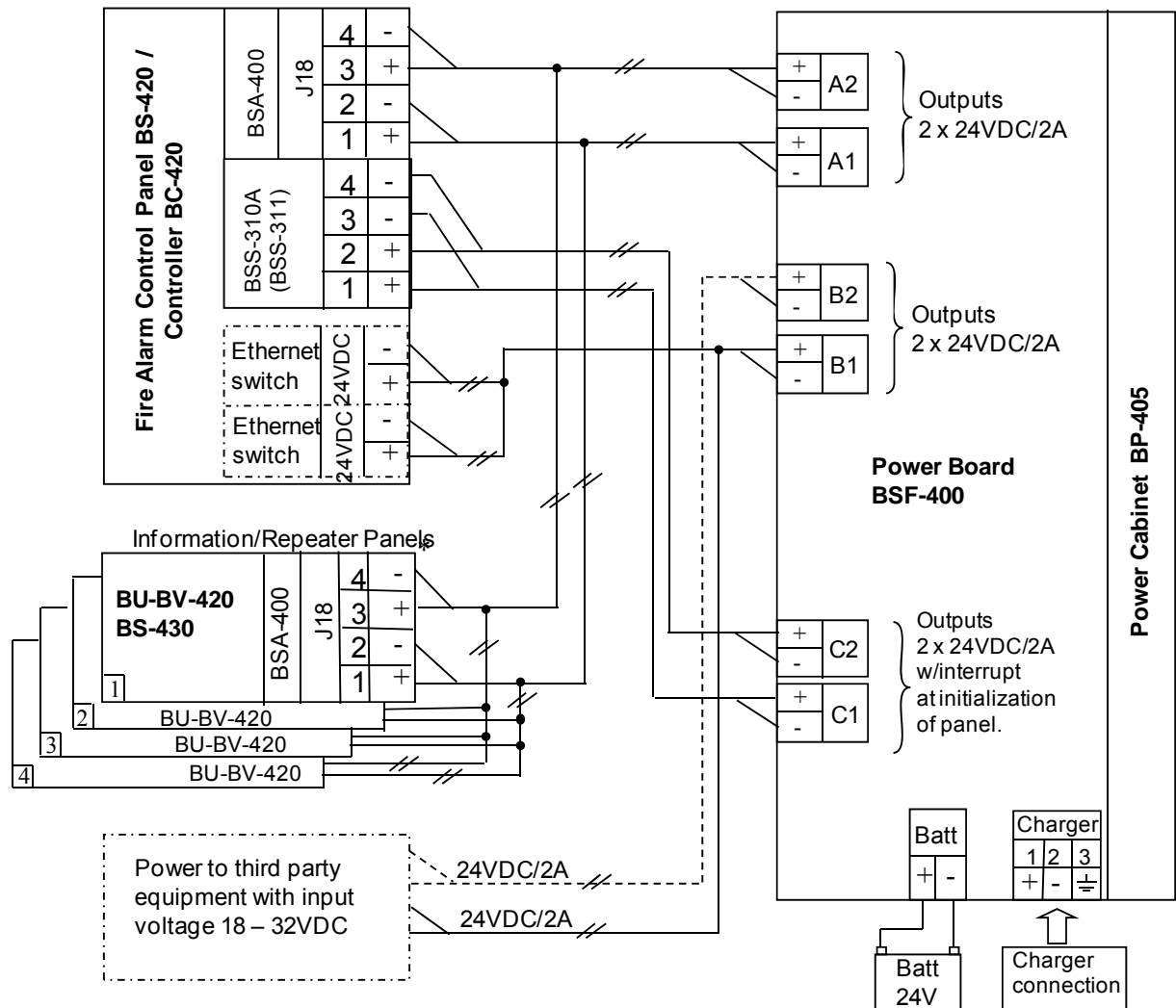
## 8.10.2 Connections to Power Board BSF-400



Output	Connections to BSF-400	Description	Intended to be used for:
A1	J19	+24V DC / 2A 0V	Monitored panel equipment.
A2	J18	+24V DC / 2A 0V	Monitored panel equipment.
B1	J24	+24V DC / 2A 0V	External equipment.
B2	J23	+24V DC / 2A 0V	External equipment.
C1	J22	+24V DC / 2A 0V	External equipment. 3 seconds break at initialization of panel.
C2	J21	+24V DC / 2A 0V	External equipment. 3 seconds break at initialization of panel.



### 8.10.3 Power Connection Overview



\* External panels type BU-BV-420 and BS-430 can be connected both to output A and B. Devide total power to both A and B.

----- Connected if needed.

## 8.11 Mains Power Connections

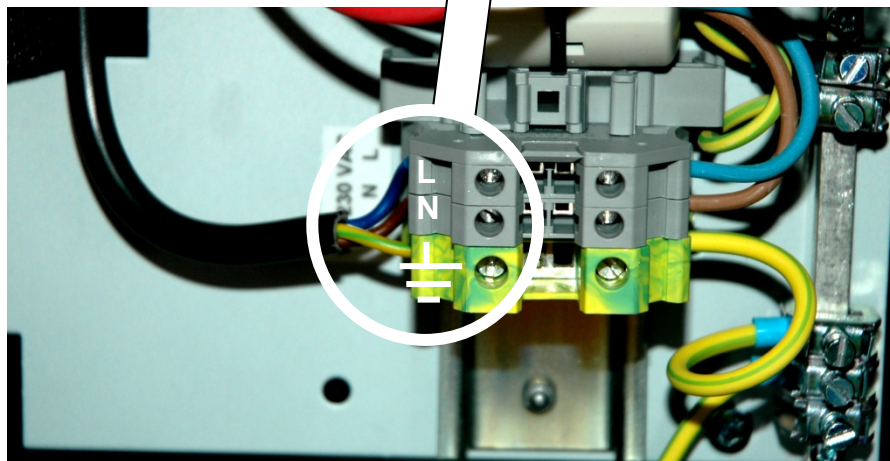
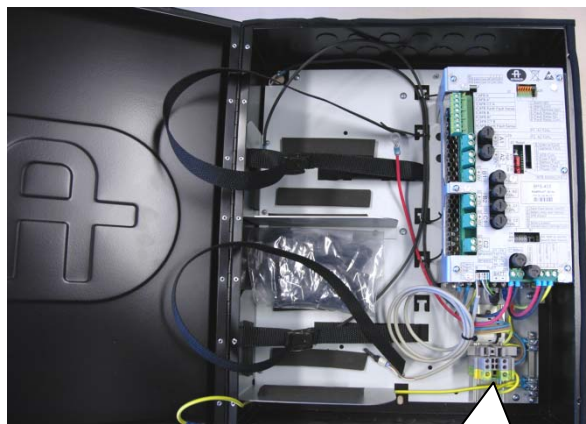


**POWER OFF!**

Power must not be applied before commissioning, refer to Commissioning Handbook.

When applying power during commissioning, always connect the cables to the batteries in the Power Cabinet BP-405 first, then power up the system shortly afterwards by connecting the mains cable to a mains socket (230V/115V AC) or by switching the power ON from an external main fuse box.

The connection of mains power (AC) to the Power Cabinet BP-405 is shown below. Note that the isolation must be kept on the mains cable as close up to the terminal points (L, N and  $\perp$ ) as possible.



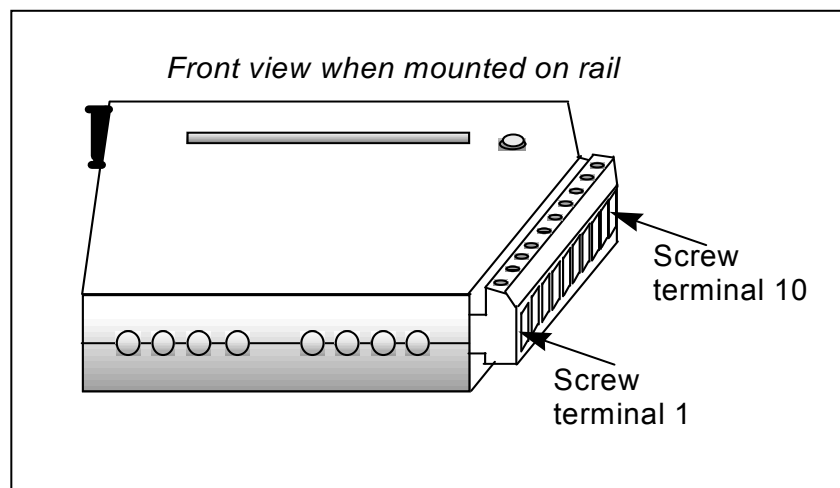
## 9. Installing I/O Modules

### 9.1 Introduction

This chapter provides information on the mounting and removal of I/O modules.

Note that the internal *Power Module (BSS-310A)* and the *Communication Module (BSL-310)* are already mounted in a fixed position when the product leaves the factory.

### 9.2 Front View of I/O Module



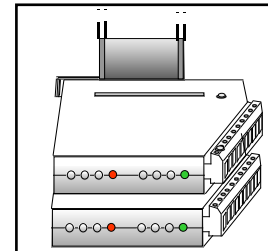
## 9.3 Mounting / Removing I/O Modules

### 9.3.1 General

**Note! Make sure the mains power is OFF!**

Note: The Power Module (BSS-310A) must always be mounted first on the rail - at the bottom - before any other modules. The Communication Module (BSL-310) is then mounted on top of the Power Module. If the optional Dual Power Monitoring Module BSS-311 is to be used, this module always has to be mounted at the bottom – before BSS-310A and BSL-310.

All other modules can be mounted in arbitrary order on top of these modules.



*Fixed Position*

BSL-310

BSS-310A

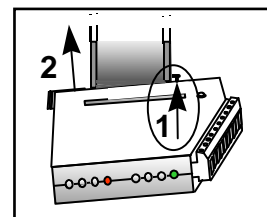
(BSS-311, optional)

When the system is to be configured at a later point, note that the AutoSafe Configuration Tool graphically shows the first module on the top of the figure and the following in descending order. This is opposite to the physical mounting, and must be taken into consideration when configuring the system. Also note that the configuration tool does not show the BSS-311 and BSL-310.

### 9.3.2 Mounting

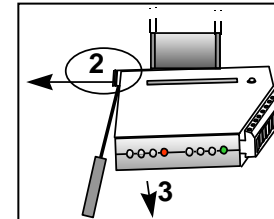
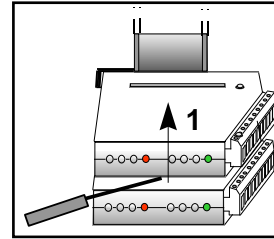
The connection block on the I/O module must be pointing to the right when the module is to be inserted.

- Snap the right side of the fastener onto the mounting rail (1), then press the module slightly inwards (2) until the left side fastens.
- Then, carefully press the module downwards as far as possible. Make sure that the module is properly connected to the module below.



### 9.3.3 Removing

- Unplug the connection block.
- Use a screwdriver to carefully lift the topmost module upwards (1) until the connector between the modules is free.
- Use the screwdriver to slightly bend the left side of the fastener *towards left* (2) until it loosens, then remove (3) the module.
- If necessary, continue removing the next one in the same way.



### 9.3.4 Before Connecting Cables



**POWER OFF!**

- Before connecting cables, make sure that the mains power is *not* connected.

## 9.4 Data Sheets - I/O Modules

The AutoSafe User Documentation provides data sheets for I/O modules, including a short description of the I/O module, its application, plus technical specifications and cabling. The subsequent chapters in this handbook provide necessary information on connections, screw terminals and signals for the following modules:

- Dual Power Monitoring Module, BSS-311 (optional)
- Power Module, BSS-310A
- Communication Module, BSL-310
- Loop Driver Module, BSD-310 / BSD-311
- Output Module, monitored, BSB-310A
- Output Module, BSJ-310
- Input Module, monitored, BSE-310
- Input Module, BSE-320

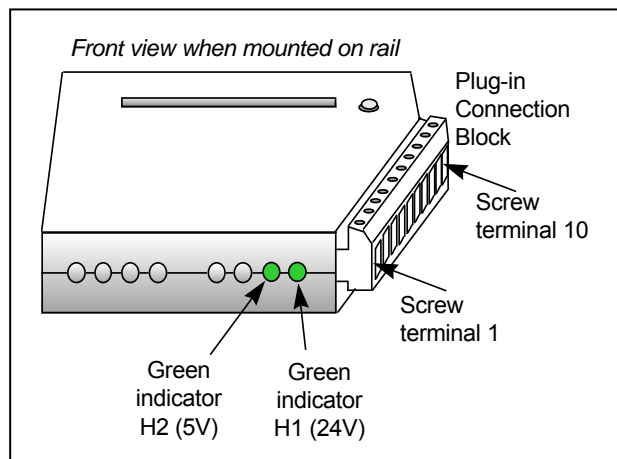
## 9.5 Power Module, BSS-310A

The I/O module has the following connections:

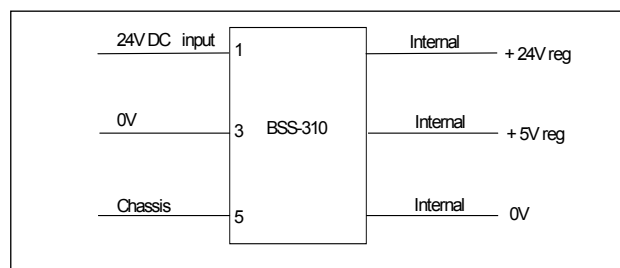
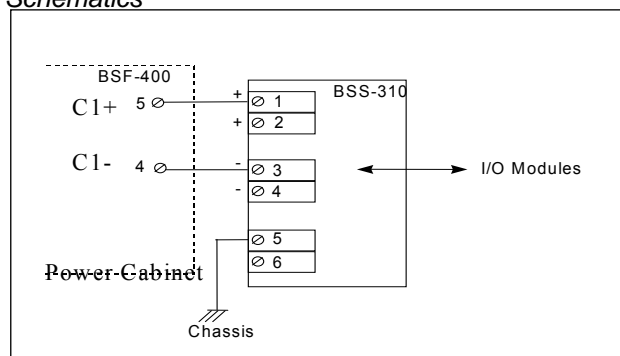
Screw Terminal no.	Signal
1	+24 V Input
2	+24 V Input
3	0 V Input
4	0 V Input
5	Chassis
6	Chassis
7	Not in use
8	Not in use
9	Not in use
10	Not in use

The module has two green indicators;

- Right green indicator (H1) - the presence of 24V DC
- Left green indicator (H2) - the presence of 5V DC



### Schematics



## 9.6 Dual Power Monitoring Module

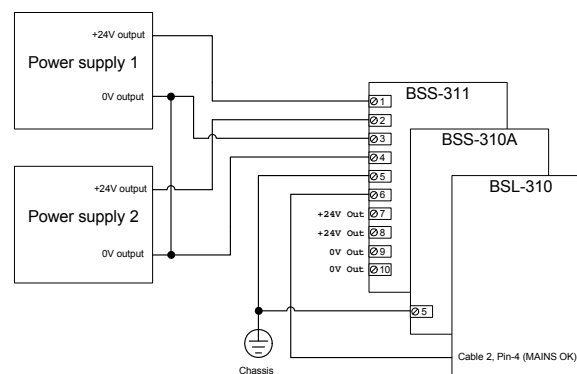
The Dual Power Monitoring Module BSS-311 provides redundant power input to the Power I/O Module BSS-310A mounted in the Fire Alarm Control Panel (BS-420) or the Controller (BC-420).

The module has the following connections:

Screw Terminal no.	Signal
1	+24V Input (Source 1)
2	+24V Input (Source 2)
3	0V Input-1 (Source 1)
4	0V Input-2 (Source 2)
5	Chassis (GND)
6	Common Power Fault Output (24V=Normal, 0V=Power Fault)
7	+24V Out
8	+24V Out
9	0V Out
10	0V Out



### Schematics

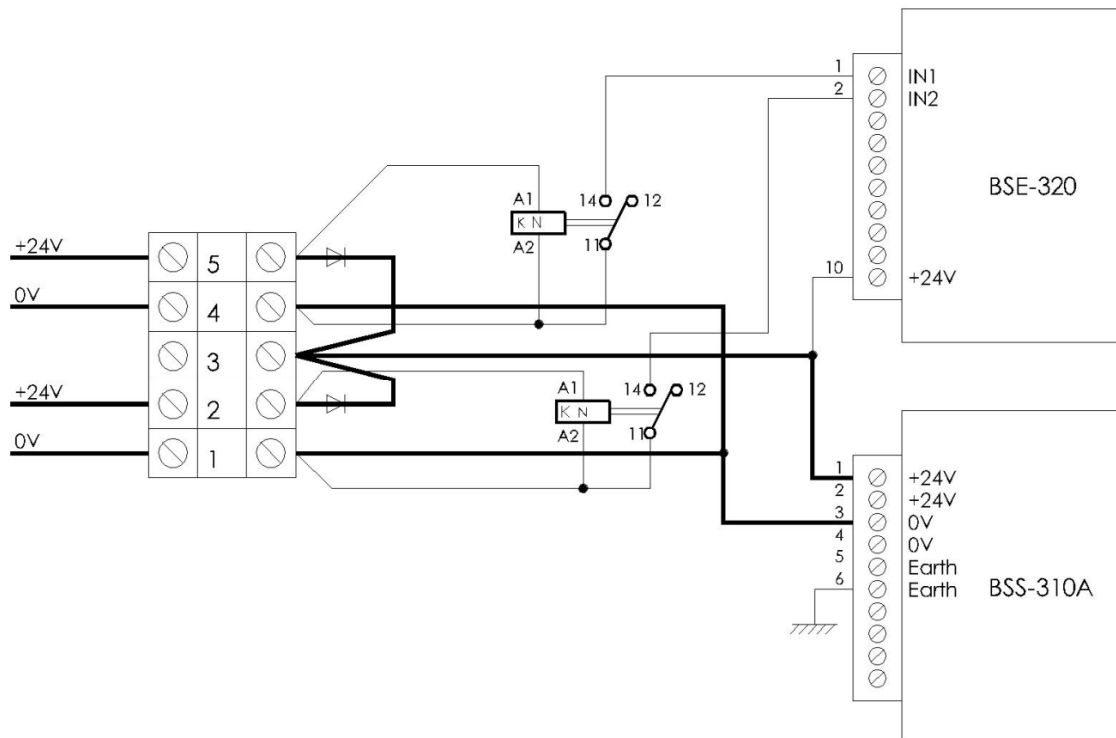


NOTE! The power supply module BSS-310A receive power from the internal plug-in connector

## 9.7 Redundant Power I/O Module – Circuit Diagram

The Dual Power Monitoring Module BSS-311 is used to provide redundant power input to the Power I/O Module BSS-310A (refer to previous chapter).

When 24V DC is provided from an external source outside the cabinet, as an alternative, power redundancy can be achieved by the electrical connections shown below (using the kit, Redundant Power IO Module, part number 116-BS-1342).





## 9.8 Communication Module, BSL-310

Connector on ribbon cable	Signal	The other end of the ribbon cable XGE-1/10-50 is connected to the Controller Board BSA-400 (refer to chapter 7.2.1).
1	INT	
2	RS_GND	
3	TX	
4	RS_GND	
5	N.C. (GND)	
6	RS_GND	
7	RX	
8	RS_GND	
9	CTS	
10	RS_GND	

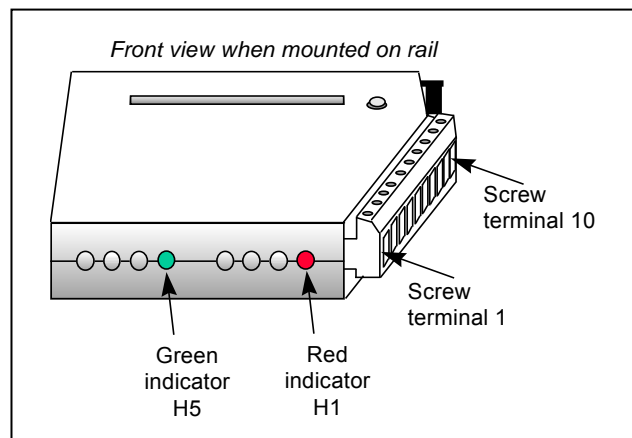


Connector on ribbon cable 2, to power module BSS-103A/02	Signal
1	TEST
2	N.C.
3	N.C.
4	MAINS_OK
5	N.C.
6	APPLY_LOAD

## 9.9 Loop Driver Module, BSD-310 / BSD-311

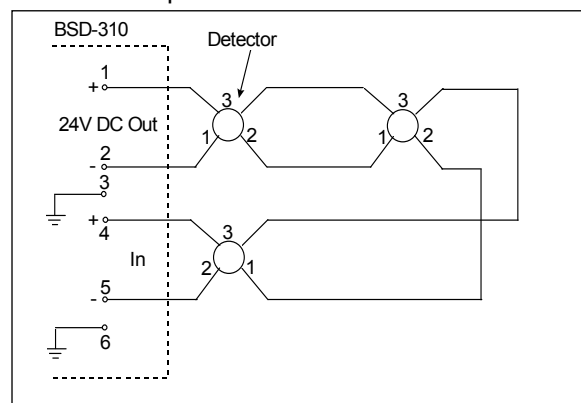
Screw Terminal no.	Signal
1	OUT + (+24V)
2	OUT - (0V)
3	Shield
4	IN +
5	IN -
6	Shield
7	F/S +
8	F/S -
9	Chassis
10	Chassis

- Green indicator, H5. Communication indicator that gives a pulsing green light during traffic.
- Red indicator, H1. Fail\_Safe indicator that gives a steady red light if a communication failure occurs, i.e. the system does not respond to an alarm.

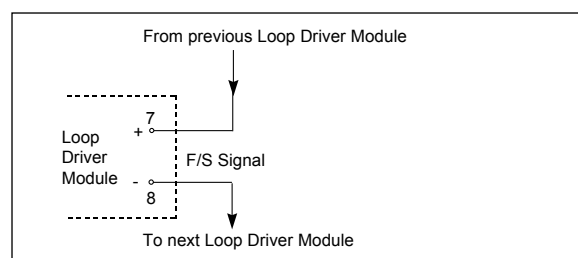


### Schematics

#### Detection loop connection



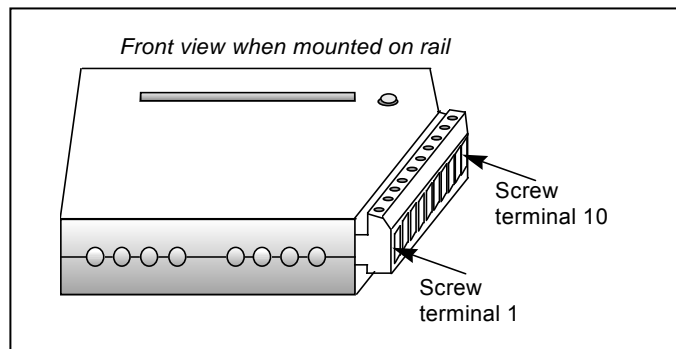
#### Failsafe connection



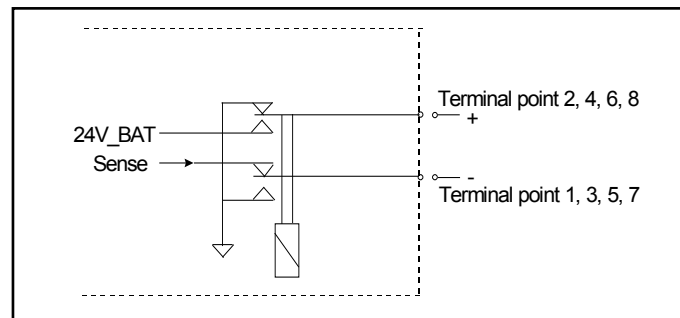
## 9.10 Output Module, Monitored, BSB-310A

Screw Terminal no.	Signal
1	Output AK1 - (0V)
2	Output AK1 + (+24V)
3	Output AK2 - (0V)
4	Output AK2 + (+24V)
5	Output AK3 - (0V)
6	Output AK3 + (+24V)
7	Output AK4 - (0V)
8	Output AK4 + (+24V)
9	External 24V
10	External 0V

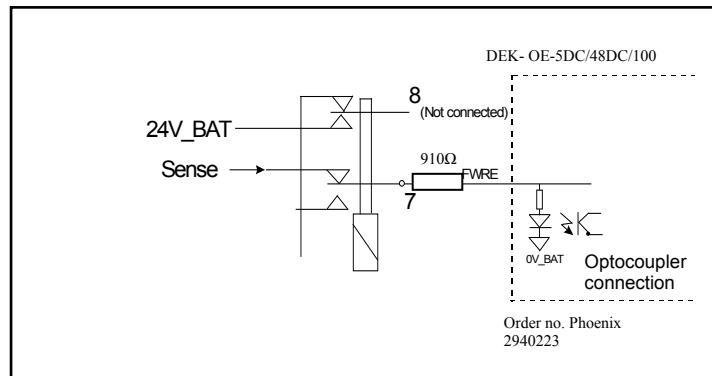
Power to outputs 9 and 10 must have a 4A fuse.



*Schematics - Monitored Output*

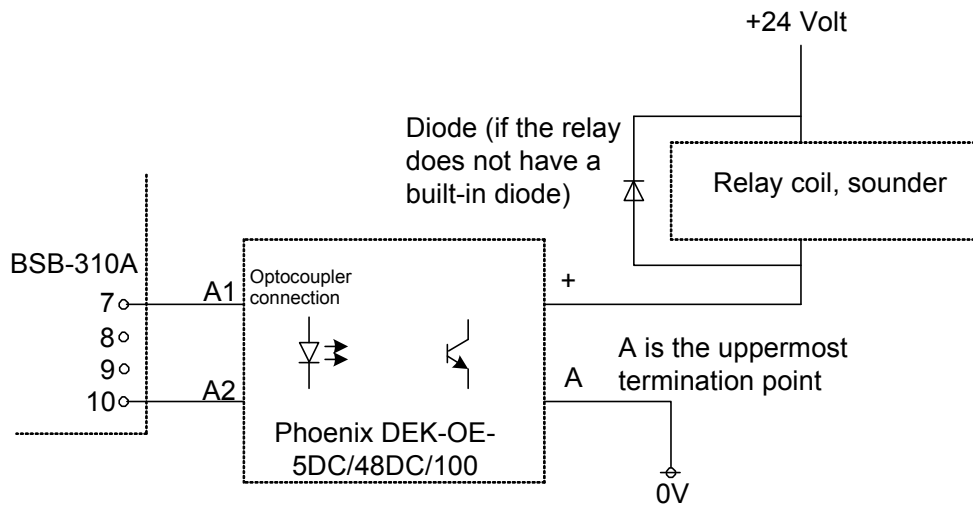


*Schematics - Fault Warning Routing Equipment (FWRE) Output Output 4 only.*



## 9.11 Connection for FWRE on BSB-310A

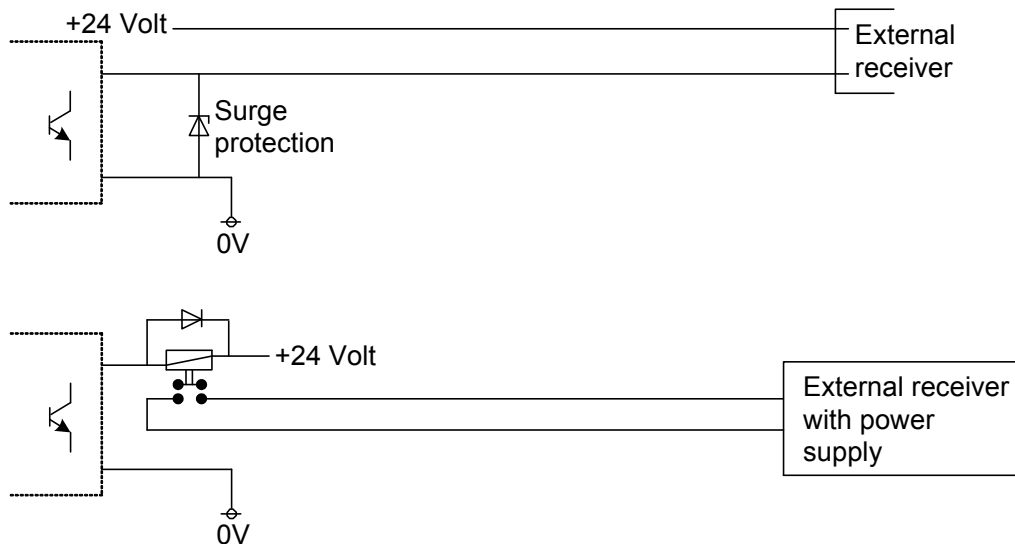
Connection for FWRE (Fault Warning Routing Equipment) -  
Output 4 on the Output Module BSB-310A (monitored)



The output transistor's max. load between + and A is 100 mA/48 V.

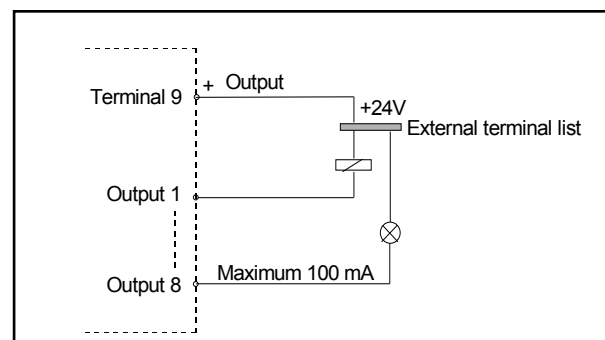
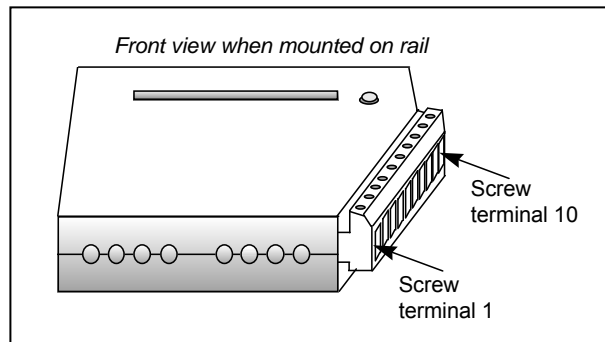
The optocoupler has a galvanic isolation for transient protection. If the distance exceeds 10 meters it is recommended that a relay is used between the optocoupler and the control output, or that the transistor has surge protection.

Example of connections with and without a relay

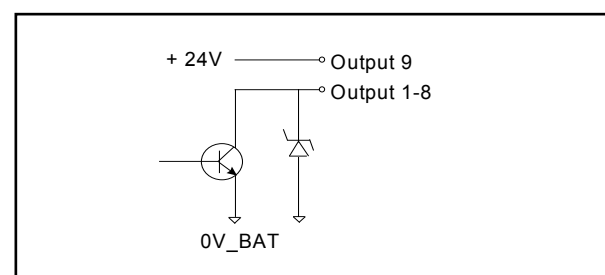


## 9.12 Output Module, BSJ-310 (non-monitored)

Screw Terminal no.	Signal
1	OC1
2	OC2
3	OC3
4	OC4
5	OC5
6	OC6
7	OC7
8	OC8
9	24 VBAT Output
10	Chassis

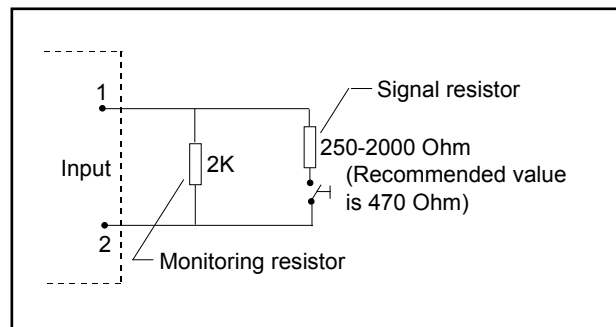
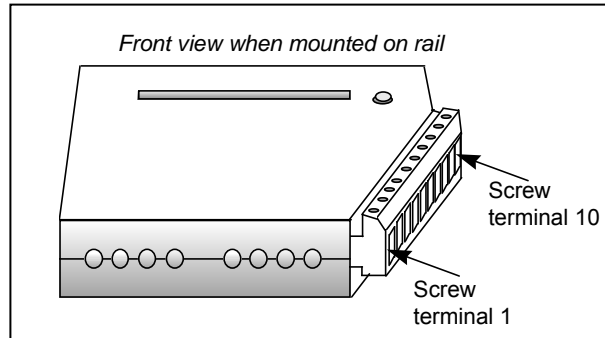


### Schematics

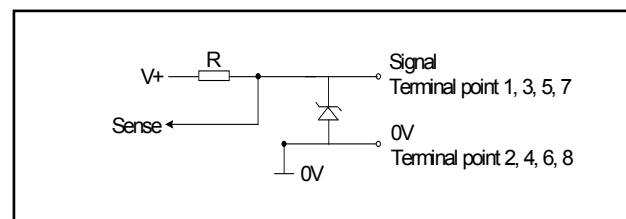


## 9.13 Input Module, Monitored, BSE-310

Screw Terminal no.	Signal
1	IN1 +
2	IN1 - (0V)
3	IN2 +
4	IN2 - (0V)
5	IN3 +
6	IN3 - (0V)
7	IN4 +
8	IN4 - (0V)
9	NA
10	NA

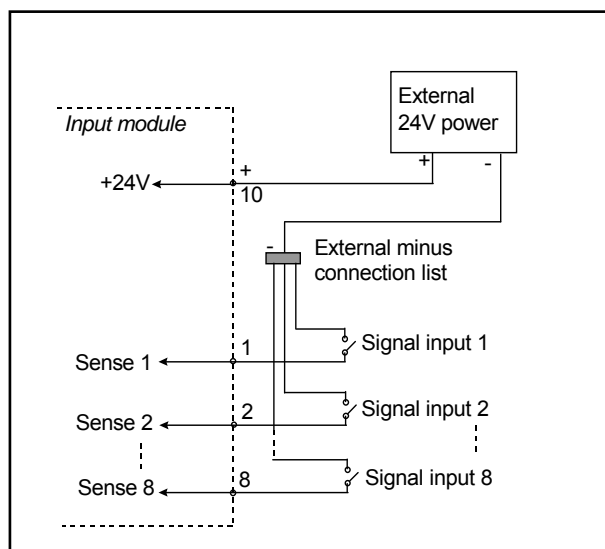
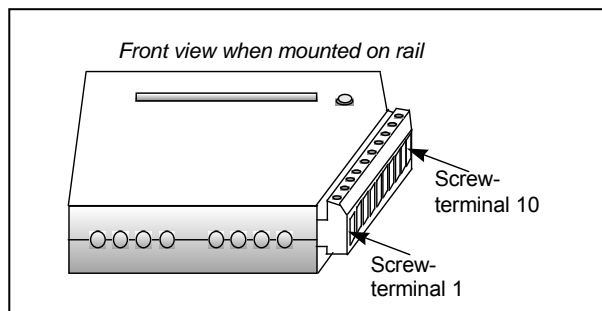


### Schematics

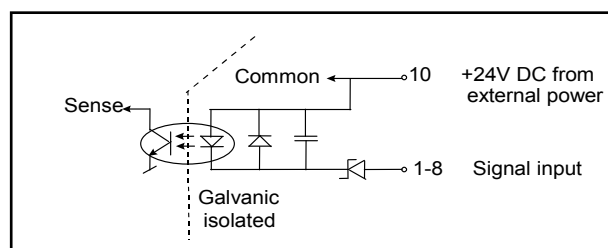


## 9.14 Input Module, BSE-320 (non-monitored)

Screw Terminal no.	Signal
1	IN1
2	IN2
3	IN3
4	IN4
5	IN5
6	IN6
7	IN7
8	IN8
9	n.c.
10	INx-power supply Common source to all inputs (+)



### Schematics



# 10. Dual Safety Installation

---

## 10.1 Dual Safety System Overview

An AutoSafe system using the Dual Safety concept consists of a Primary System and a Secondary System. The purpose of the concept is to ensure that the Secondary System takes over the control of the detection loops if the Primary System or parts of it is lost for any reason.

To achieve this, the redundant loop control interface AutoKeeper BN-180 is required.

An AutoMaster can communicate with both the Primary and Secondary System via AutoCom.

The connections that are to be used between the Primary/Secondary System and the detection loops depend on distances and the number of Loop Driver Modules/detection loops used. Refer to Rules of Thumb and the examples in chapter 10.2.1 and 10.2.2.

## 10.2 Rules of Thumb

Note that these rules of thumb goes for *both* systems in a Dual Safety configuration:

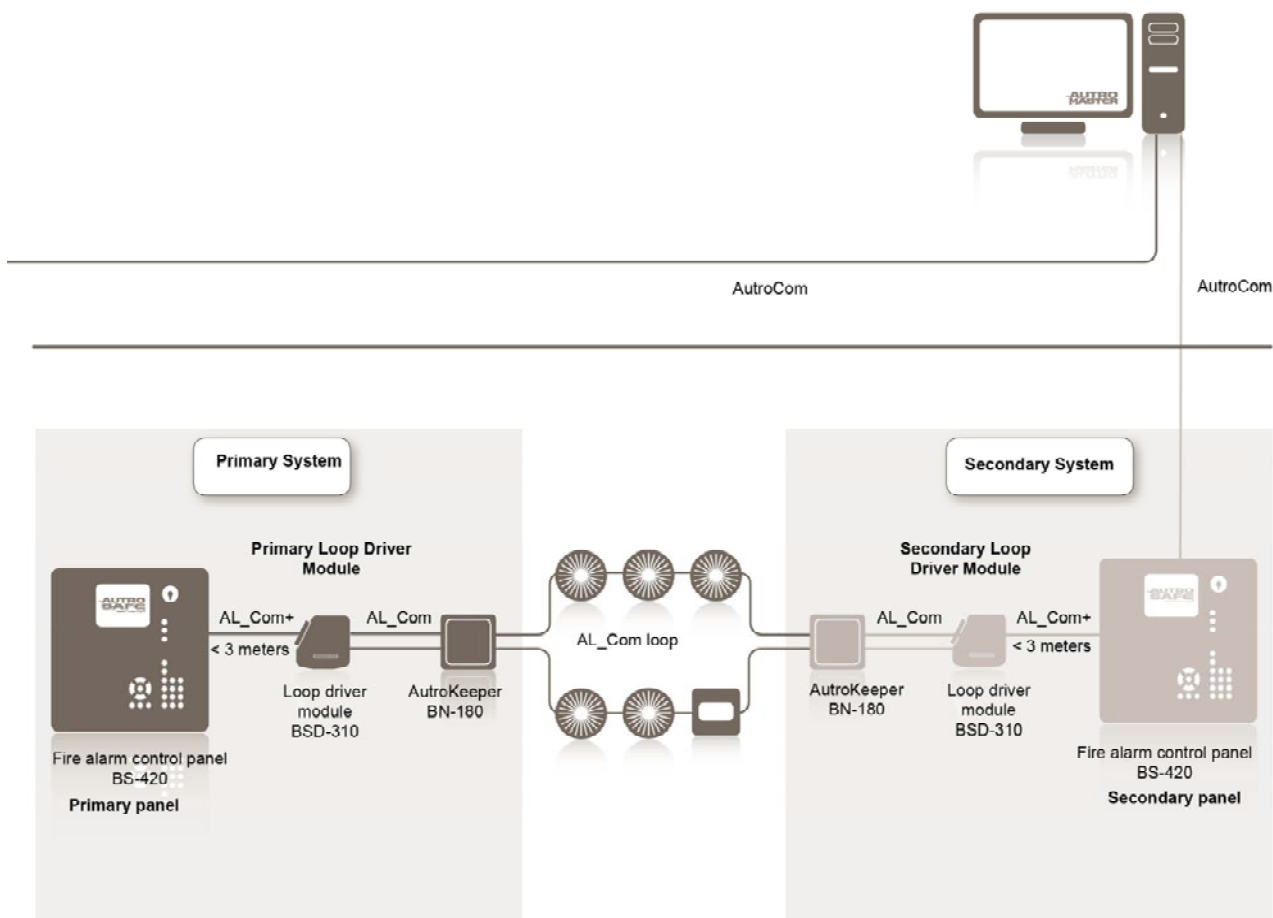
- Up to 6 Loop Driver Modules can be connected to one AL\_Com+ stack
- Up to 12 Loop Driver Modules can be connected to one panel
- Up to 6 Loop Driver Modules can be connected to one panel directly (one AL\_Com+ stack) if the cable length between the panel's main board AL\_Com+ port and the AL\_Com+ stack is less than 3 meters.
- Up to 12 Loop Driver Modules can be connected to one panel through AutoFieldBus (up to 12 AL\_Com+ stacks). This solution has to be used if the cable length between the panel's main board and the AL\_Com+ stack exceeds 3 meters, but can also be used for cable lengths less than 3 meters.



### 10.2.1 Example 1: Connections Using AL\_Com+ only

The distance from the Primary Panel to the Loop Driver Module is less than 3 meters. An AL\_Com+ flat ribbon cable is used between the panel AL\_Com port and the AL\_Com+ stack (including the Loop Driver Module).

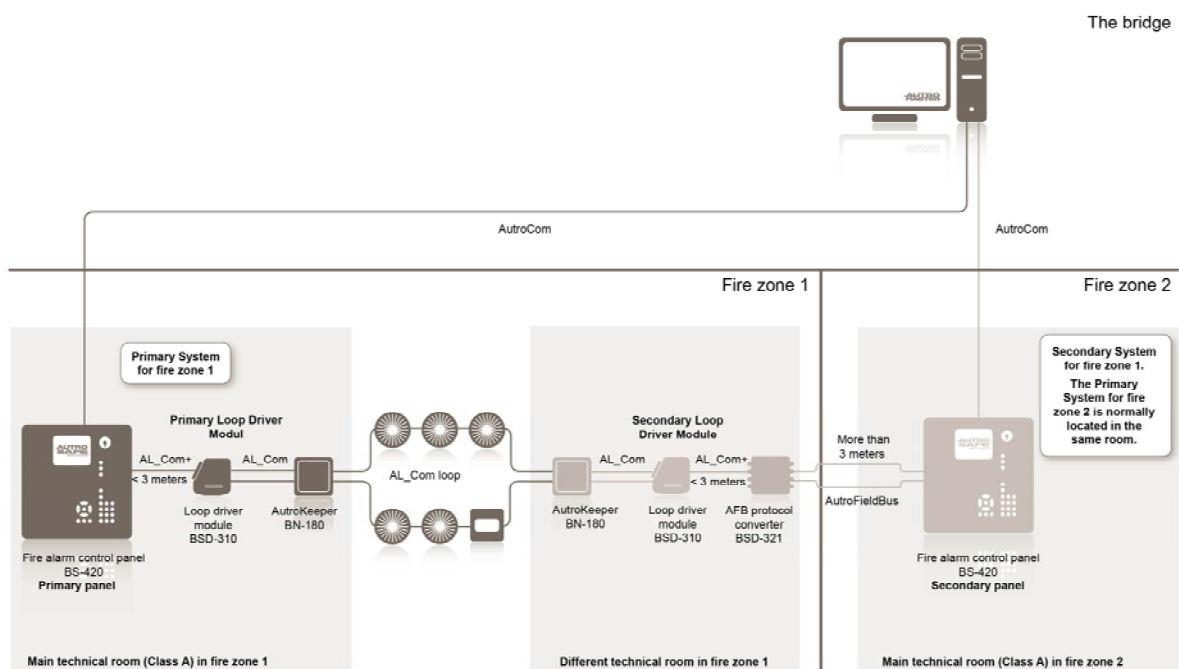
The distance from the Secondary Panel to the Secondary Loop Driver Module is less than 3 meters. An AL\_Com+ flat ribbon cable is used between the panel AL\_Com port and the AL\_Com+ stack (including the Secondary Loop Driver Module).



### 10.2.2 Example 2: Connections using both AL\_Com+ and AutoFieldBus

The distance from the Primary Panel to the Primary Loop Driver Module is less than 3 meters. An AL\_Com+ flat ribbon cable is used between the panel AL\_Com port and the AL\_Com+ stack (including the Loop Driver Module).

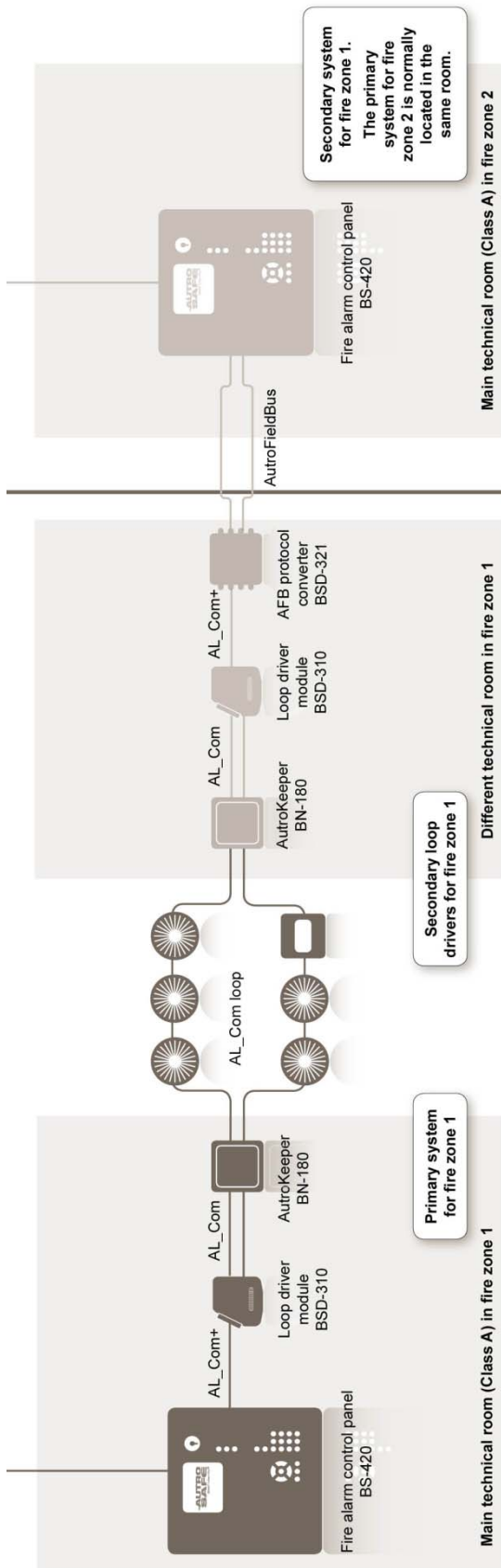
The distance from the Secondary Panel to the Secondary Loop Driver Module is more than 3 meters. An AL\_Com+ flat ribbon cable (maximum 3 meters) is used between the AutoFieldBus (AFB) Protocol Converter BSD-321 and the AL\_Com+ stack (including the Secondary Loop Driver Module). The AFB Protocol Converter is connected to the panel's AFB. The AFB cable length can be up to 1000 meters. Booster equipment can be added to exceed the AFB cable length even further.



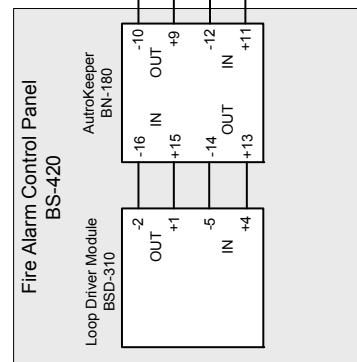
## 10.3 Connections Overview

There are two AutoKeepers BN-180 for each detection loop in a Dual Safety System (see next page). One must be assigned to the Primary System and the other to the Secondary System (dipswitch setting, see 10.3.2). The BSD-321 (if used) must be set to the AL\_Com+ protocol (default).

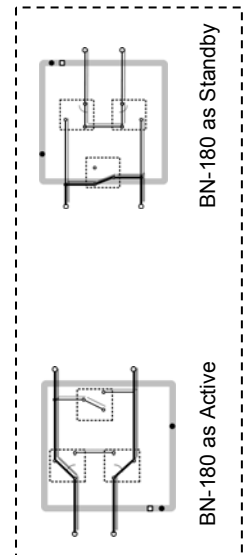
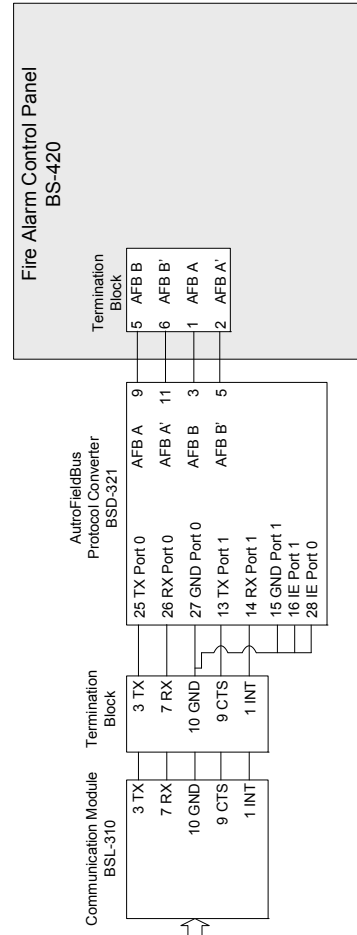
The AutoKeeper is physically placed between the loop controller (BSD-310) and the detection loop (one belonging to the Primary System and one belonging to the Secondary System) and thus controlling/providing the loop controller access to the detection loop.



## Primary System



## Secondary System



Patented component to meet  
the new SOLAS requirement

### 10.3.1 Connections – AutoKeeper BN-180

Pin number	Description	
1	TTL COM	Debug port (internal use only)
2	TTL IN	Debug port (internal use only)
3	TTL OUT	Debug port (internal use only)
4	GND	
5	24V IN	Power In (Green LED)
6	0V IN	Power In
7	FAILSAFE COM	FailSafe Rel. (future)
8	FAILSAFE NO	FailSafe Rel. (future)
9	OUTLOOP +	To “first” Loop Unit
10	OUTLOOP -	--“--
11	INLOOP +	To “last” Loop Unit
12	INLOOP -	--“--
13	OUT +	To Loop Driver’s IN +
14	OUT -	To Loop Driver’s IN -
15	IN +	To Loop Driver’s OUT+
16	IN -	To Loop Driver’s OUT -
DIN rail conn. 1	24V IN	Power In
DIN rail conn. 2	0V IN	Power In
DIN rail conn. 3	Not used	
DIN rail conn. 4	Not used	
DIN rail conn. 5	GND	

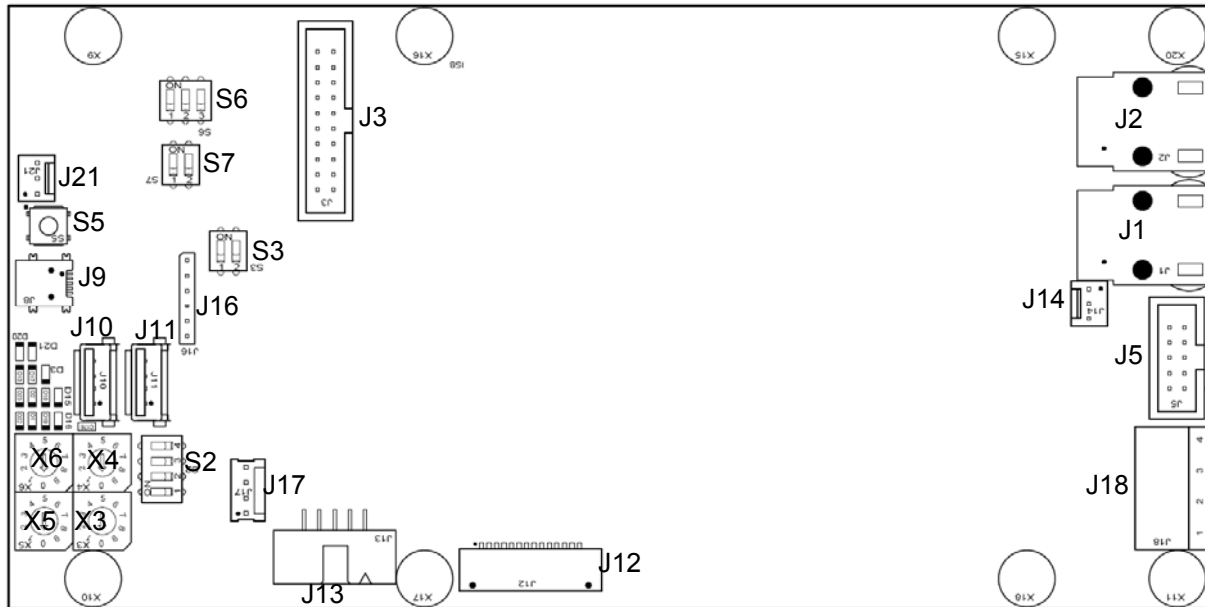
### 10.3.2 Switch Settings – AutoKeeper BN-180

Dipswitch 1 determines whether the BN-180 in question is Primary or Secondary.

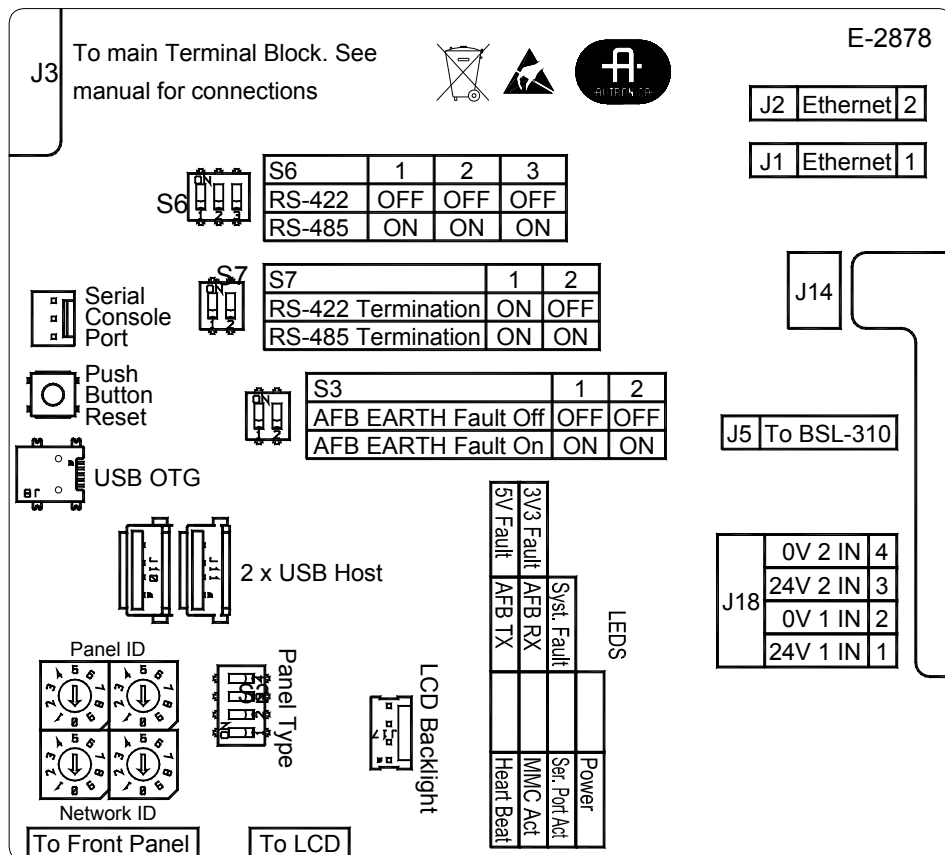
Dip-switch	Description (ON/OFF)
1	“Ascription” (use one of each): Off – Primary / On – Secondary
2	Off – Normal operation (Seen as AL_Com unit) On – Force Majeur (If Ascription Primary: Active, Secondary: Standby – automatic actions disabled)
3	When switched to On or Off the unit will be reset within 5 seconds

# 11. Controller Board BSA-400

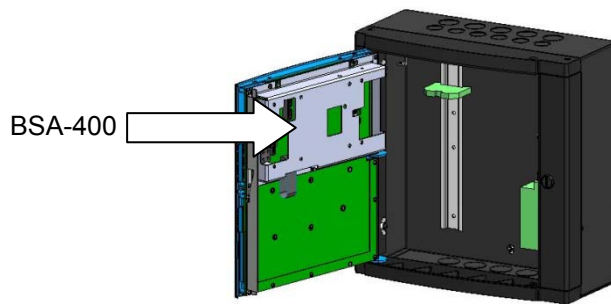
## 11.1 Circuit Board Layout



Label on cover



## 11.2 Location inside Fire Alarm Control Panel BS-420



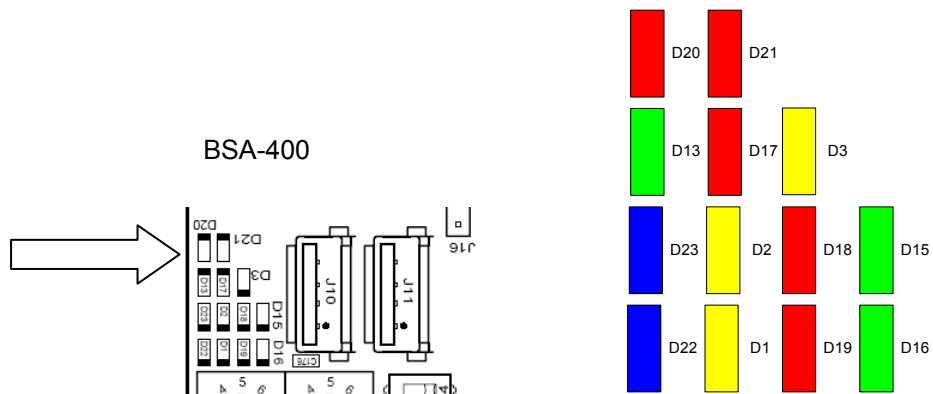
## 11.3 Description

The Controller Board BSA-400 is the main CPU which controls all system functionality.

The system offers the following communication ports:

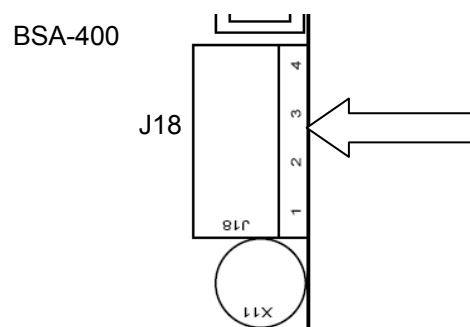
- 2 Ethernet ports for AutoNet and/or AutoCom, plus downloading of configuration data and system software
- 1 AL\_Com+ interface (loop communication)
- 1 RS-232, RS-422 or RS-485 serial port for communication with third party equipment (AutoCom /ESPA4.4.4/MODBUS/VDR)
- 1 AutoFieldBus (AFB) interface
- 2 USB host ports for the connection of a printer and for the connection of a memory stick for downloading configuration data and system software
- Interface for the connection of display and front board
- FailSafe relay output

## 11.4 Internal LED Indicators



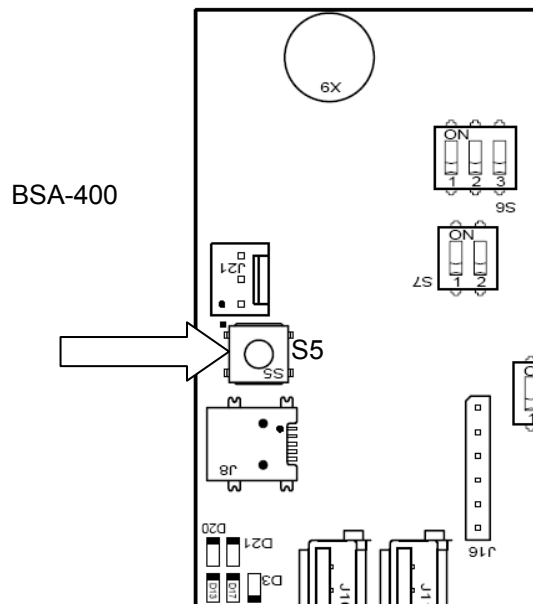
LED	Colour	Function
D1	Yellow	SD-Card activity indicator
D2	Yellow	USB Boot Time Rescue upgrade in progress
D3	Yellow	System fault LED, ON when system is locked in system fault
D13	Green	AutroFieldBus TX
D15	Green	NA
D16	Green	Power indicator
D17	Red	AutroFieldBus RX
D18	Red	NA
D19	Red	Serial Port activity indicator
D20	Red	System reset 5V
D21	Red	System reset 3,3V
D22	Blue	System heart beat
D23	Blue	NA

## 11.5 Power Input Connector J18 (screw terminal)



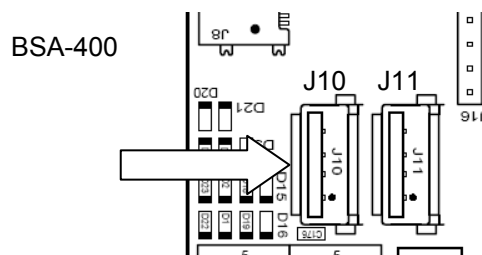
Connector J18 on Controller Board BSA-400	Description		Connection to Power Board BSF-400
J18.1	+24V DC In 1	Interconnection	A1 +
J18.2	0V In 1		A1 0V
J18.3	+24V DC In 2		A2 +
J18.4	0V In 2		A2 0V

## 11.6 Two-stage Push Button Reset (S5)



- To shut down the system in a controlled manner, push less than 1 second.
- To perform a hard reset without needing to do a controlled shutdown (the system is already in system fault condition), push and hold down the reset button S5 (approximately 10 seconds) until the red LED indicators D20 and D21 are lit for a short moment and you hear a click from the relay.

## 11.7 USB Ports (J10, J11)



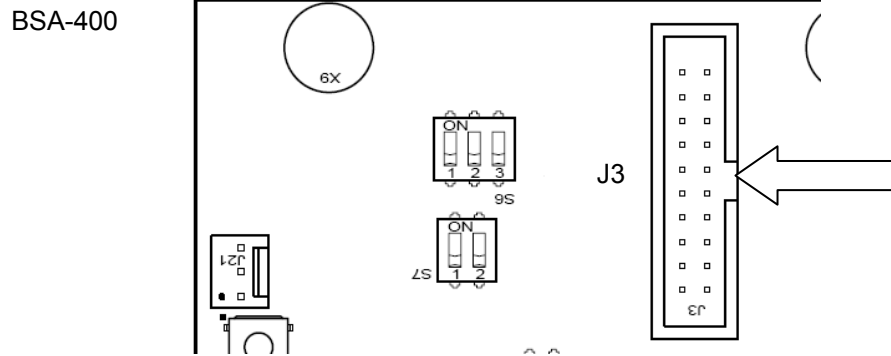
There are 2 standard USB full speed (480Mbit) host ports; type A connector. The ports are to be used for connection of an optional printer or a memory stick .

Each USB host port is limited to a maximum of 100mA load.



## 11.8 Multifunction Serial Port Connector J3 - AutoFieldBus and Fault Relay

A ribbon cable is connected between the Multifunction Serial Port Connector J3 and the main terminal block L1 (mounted on the DIN rail inside the cabinet).



Connector J3 on Controller Board BSA-400	Description	Connections to terminal block (L1)
J3.1	GND	L1.1
J3.2	GND	L1.2
J3.3	AutoFieldBus B	L1.3
J3.4	Multifunction Serial Port RS-422/RS485 A+	L1.4
J3.5	AutoFieldBus B'	L1.5
J3.6	Multifunction Serial Port RS-422/RS485 B-	L1.6
J3.7	AutoFieldBus B Reference	L1.7
J3.8	Multifunction Serial Port RS-422 X+	L1.8
J3.9	AutoFieldBus A	L1.9
J3.10	Multifunction Serial Port RS-422 Z-	L1.10
J3.11	AutoFieldBus A'	L1.11
J3.12	Multifunction Serial Port RS-232 TX	L1.12
J3.13	AutoFieldBus A Reference	L1.13
J3. 14	Multifunction Serial Port RS-232 RX	L1.14
J3.15	GND	L1.15
J3.16	Multifunction Serial Port Reference	L1.16
J3.17	Fault Relay Normal Open	L1.17
J3.18	GND	L1.18
J3.19	Fault Relay Normal Closed	L1.19
J3.20	Fault Relay Common	L1.20

The built-in AutoFieldBus Master driver serves as a communication protocol between the AutoSafe panel, the BSD-340 PowerLoop drivers and BSD-321 protocol converters, plus Power Board BSF-400. It provides a redundant field bus system with a ring loop topology.

The AutoSafe panels have one AutoFieldBus connected, and each AutoFieldBus can host up to 31 bus units.

The AutoFieldBus has short-circuit detection/isolation technology which ensures that only one AutoFieldBus bus unit will be lost in case of internal failure (short-circuit).

The ring loop topology ensures that no detectors/field units will be lost due to a single break or short circuit of the AutoFieldBus cable.

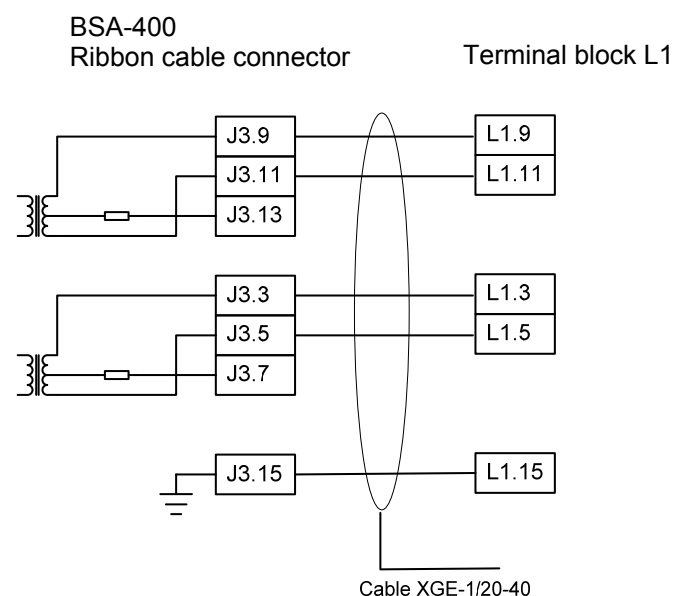
The AutoFieldBus cable is normally 2-wire twisted pair category 5 copper cables, however, fibre optic cable is possible by use of separate signal converters. The AutoFieldBus uses the same guidelines as AUTROLON (AutoSafe version 3.8 and earlier), in terms of cable lengths, fibre modem and boosters.

## 11.9 AutoFieldBus Connections

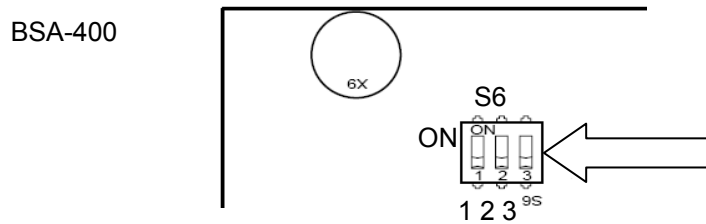
### 11.9.1 Ribbon Cable Connector BSA-400 to Terminal Block L1

Shielded cable required.

Terminal on BSA-400	Function	Terminal Block List L1
J3.9	AutoFieldBus A	L1.9
J3.11	AutoFieldBus A'	L1.11
J3.13	AutoFieldBus CT A	L1.13
J3.3	AutoFieldBus B	L1.3
J3.5	AutoFieldBus B'	L1.5
J3.7	AutoFieldBus CT B	L1.7

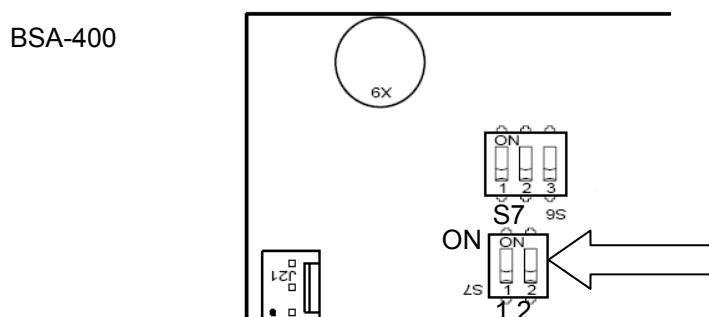


## 11.10 Multifunction Serial Port Dipswitch Settings – Switch S6 (RS-232, RS-422, RS-485)



Switch	RS-232	RS-422	RS-485
S6.1	Not applicable	OFF	ON
S6.2	Not applicable	OFF	ON
S6.3	Not applicable	ON	OFF
		RS-422 is full duplex, two-way simultaneous communication. RX always ON.	RS-485 is half duplex, one-way communication. RX OFF when TX is active.

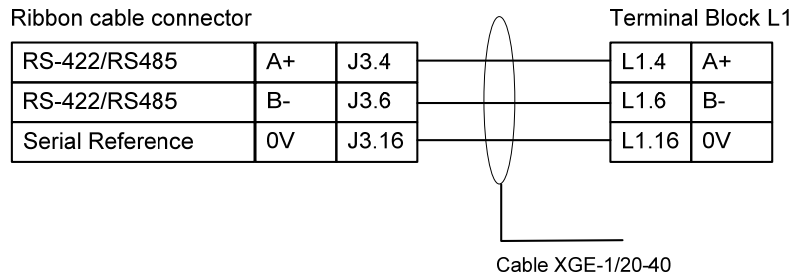
## 11.11 Multifunction Serial Port Dipswitch Settings – Switch S7



Switch	RS-232	RS-422	RS-485
S7.1	Not applicable	ON	ON
S7.2	Not applicable	ON	OFF
		RS-422 requires two pair of cables; one for RX and one for TX.  One switch is used for the termination of the RX line, the other switch is used for the termination of the TX line. Both switches must be ON.	RS-485 requires only one pair of cables where TX/RX are common. Switch S7.1 is used for the termination. S7.2 must be OFF.

## 11.12 RS-485 Connections

### 11.12.1 Ribbon Cable Connector BSA-400 to Terminal Block L1

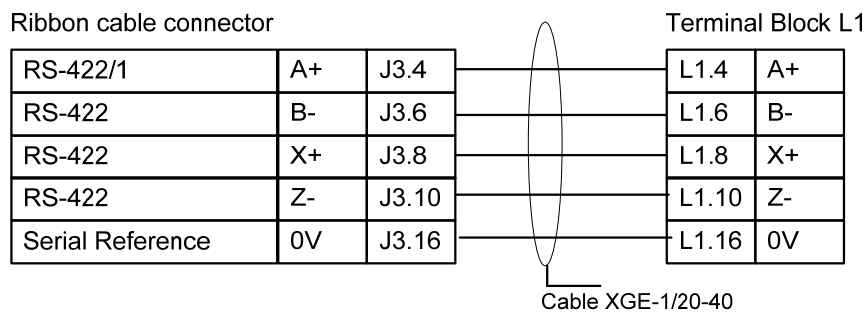


### 11.12.2 Switch Setting – Switch S6 and S7

Switch	RS-485
S6.1	ON
S6.2	ON
S6.3	OFF
S7.1	ON
S7.2	OFF

## 11.13 RS-422 Connections

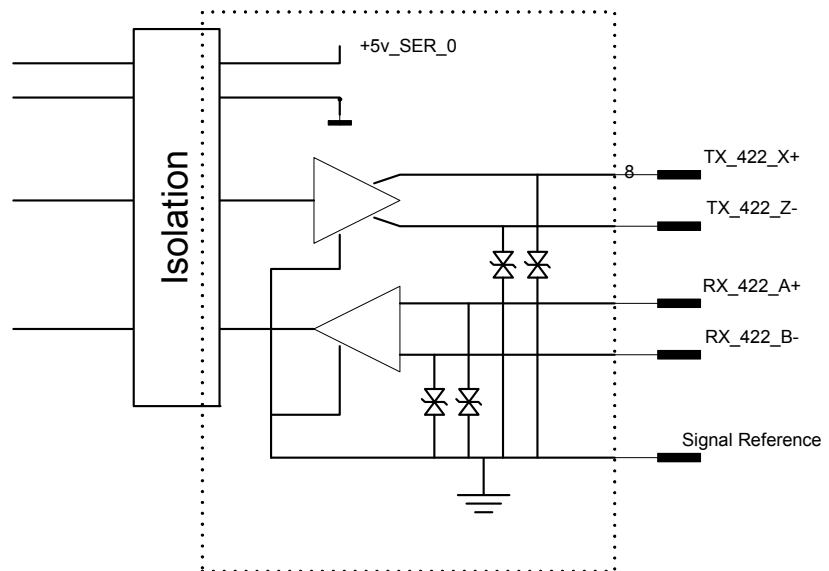
### 11.13.1 Ribbon Cable Connector BSA-400 to Terminal Block L1



### 11.13.2 Switch Setting – Switch S6 and S7

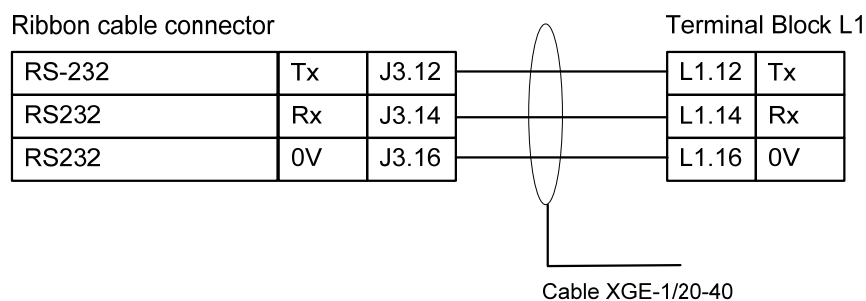
Switch	RS-422
S6.1	OFF
S6.2	OFF
S6.3	ON
S7.1	ON
S7.2	ON

### 11.13.3 Schematic of port equivalent:



## 11.14 RS-232 Connections

### 11.14.1 Ribbon Cable Connector BSA-400 to Terminal Block L1

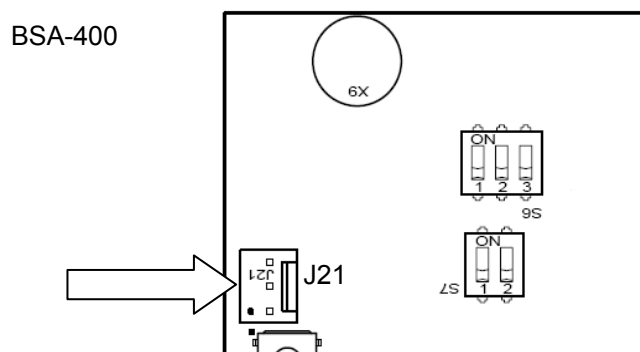


### 11.14.2 Switch Setting – Switch S6 and S7

Switch	RS-232
S6.1	Not applicable
S6.2	Not applicable
S6.3	Not applicable
S7.1	Not applicable
S7.2	Not applicable

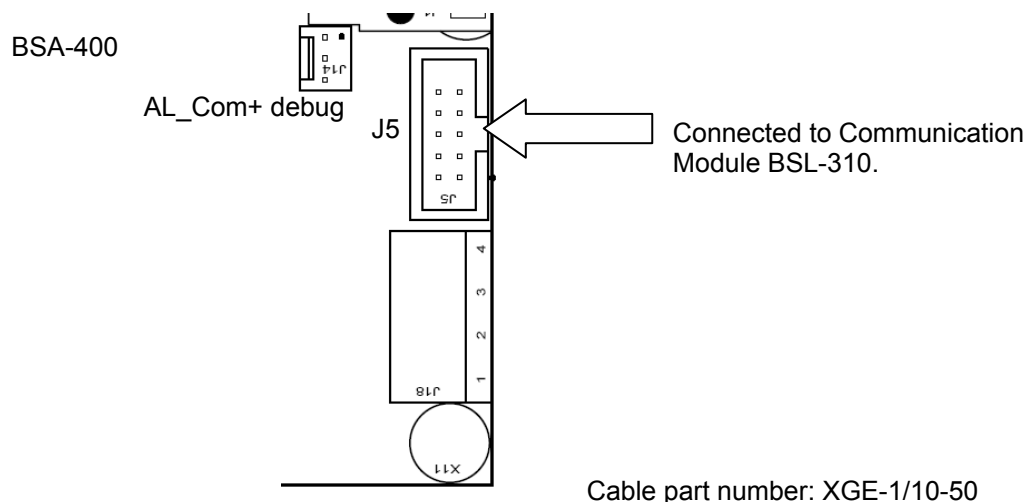
## 11.15 Serial Debug Connector J21

A standard AutoSafe programming cable XJA-029 is to be connected to this connector. The interface uses RS-232 115,2kbaud 8N1.



Connector	Description	Communication Parameters
J21.1	0V reference	115,2kbaud 8 data bit, none parity, 1 stop bit
J21.2	RX	
J21.3	TX	

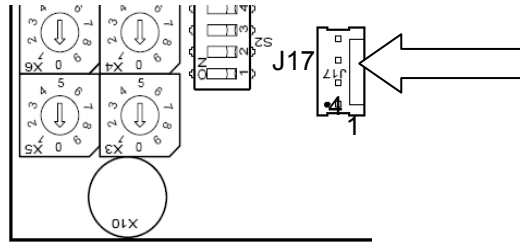
## 11.16 AL\_Com+ Connector J5



Connector	Description
J5.1	AL_Com+ CTS
J5.2	0VIN
J5.3	AL_Com+ RXD
J5.4	0VIN
J5.5	Not Connected
J5.6	0VIN
J5.7	AL_Com+ TXD
J5.8	0VIN
J5.9	AL_Com+ RTS
J5.10	0VIN

## 11.17 LCD Backlight Connector J17

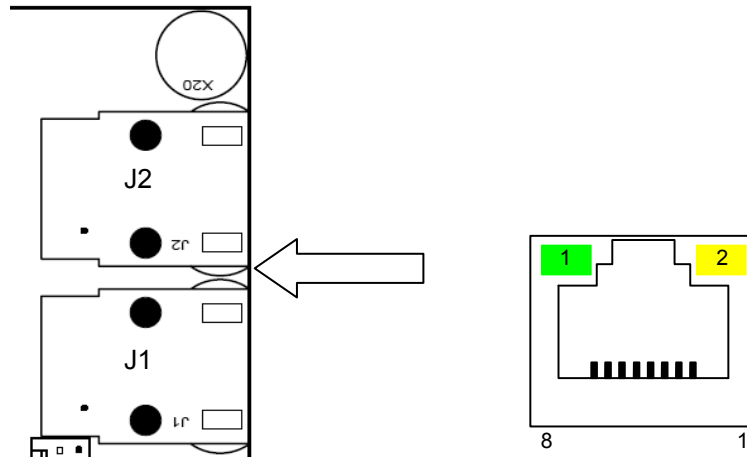
BSA-400



Connector	Description
J17.1	Backlight LED + 5V DC
J17.2	Backlight LED -
J17.3	Backlight LED -
J17.4	Backlight LED – 0V

## 11.18 Ethernet Ports (RJ-45 Connectors)

BSA-400

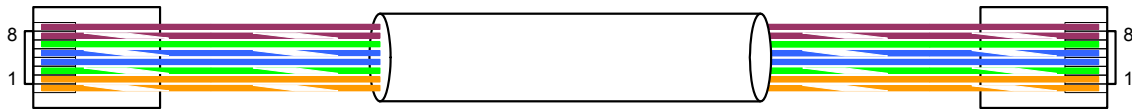


The BSA-400 board provides two separate 10/100Mbit Ethernet ports. Each connector has 2 built-in status LEDs; Link and Act/Speed. The connector is an RJ-45 modular jack, suitable for shielded cable CAT5 which allows cable lengths up to 100m.

Connector	Connector	Description
J1.1	J2.1	TX+, Transmit Data+
J1.2	J2.2	TX-, Transmit Data-
J1.3	J2.3	RX+, Transmit Data+
J1.4	J2.4	N.C.
J1.5	J2.5	N.C.
J1.6	J2.6	RX-, Transmit Data-
J1.7	J2.7	N.C.
J1.8	J2.8	N.C.

LED 1	Activity LED
LED 2	If ON, 100MBit/s, if OFF, 10MBit/s

### 11.18.1 Ethernet Straight Through Cable



Name	Pin		Cable Color	Pin	Name
TX+	1		White/Orange	1	TX+
TX-	2		Orange	2	TX-
RX+	3		White/Green	3	RX+
	4		Blue	4	
	5		White/Blue	5	
RX-	6		Green	6	RX-
	7		White/Brown	7	
	8		Brown	8	



---

# 12. Power Supply

---

## 12.1 Power Cabinet and Power Units

AutroSafe 4 provides the following power cabinet and power units:

- Power Cabinet BP-405
- Power Unit BPS-405
- Power Unit BPS-410

### 12.1.1 Power Cabinet BP-405

The Power Cabinet BP-405 contains the following:

- 24V/5A power supply (BPS-405, Meanwell Power Supply)
- Power Board BSF-400, including:
  - AutoFieldBus interface
  - 115VAC /230VAC input
  - 6 outputs 24VDC (max. 2A each)
  - 1 fault relay output
- 2x12V, 18Ah batteries

For detailed information, refer to this chapter (Power Supply) and datasheet.

### 12.1.2 Power Unit BPS-405

The Power Unit BPS-405 contains the following:

- 24V/5A power supply
- Power Board BSF-400, including:
  - AutoFieldBus interface
  - 115VAC /230VAC input
  - 6 outputs 24VDC (max. 2A each)
  - 1 fault relay output

For detailed information, refer to this chapter (Power Supply) and datasheet.

### 12.1.3 Power Unit BPS-410

Note:

The BPS-410 Power Unit 24VDC/10A is delivered as two separate part numbers:

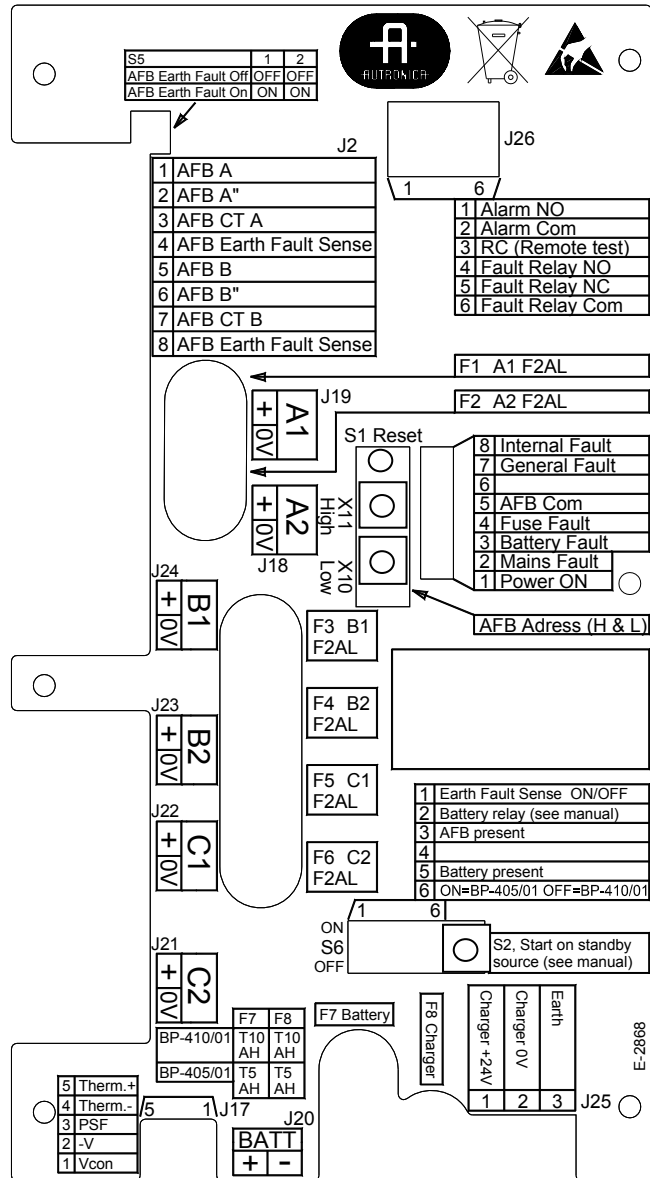
- 116-BPS-410 for 230VAC
- 116-BPS-410/115 for 115VAC

The Power Unit BPS-410 contains the following:

- 24V/10A power supply
- Power Board BSF-400, including:
  - AutoFieldBus interface
  - 115VAC or 230VAC input
  - 6 outputs 24VDC (max. 2A each)
  - 1 fault relay output

For detailed information, refer to this chapter (Power Supply) and datasheet.

## 12.2 Circuit Board Layout BSF-400



## 12.3 Description

BSF-400 is a power monitor and controller board providing a communication interface, AutoFieldBus. The board has also the ability to operate stand alone with no communication. The fault relay is energized as standard with its own watchdog.

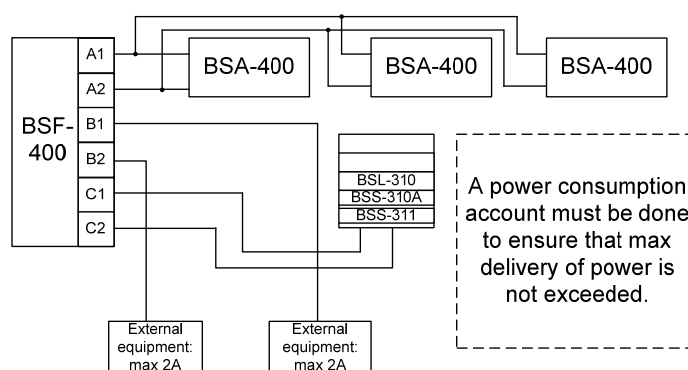
The power board provides power to AutoSafe, AutoSafe's existing I/O module stacks, battery monitoring and charging, plus 24 voltage contacts for other external equipment.

- 2 x 24V outputs of 2A to AutoSafe panel
- 2 x 24V outputs of 2A to I/O stack
- 2 x 24V outputs of 2A to third-party equipment
- 1 input for battery
- 1 input for battery charger
- Communication
- Power control for battery
- Control signals for battery charger
- All internal voltage levels are monitored
- Temperature sensor for compensation of charger voltage

BSF-400 has short circuit protection on all outputs such that a short circuit will not affect other outputs. Batteries that are connected will be charged with temperature compensation to ensure long battery life regardless of temperature (within the specified operating temperature range).

All outputs on terminations A, B and C are specified to a maximum current of 2A. There are no minimum power ratings for the outputs. The maximum power that may be used from each output is 2A and there is a current limiter implemented at 7A.

## 12.4 Power Block Diagram – Example



## 12.5 Batteries

The recommended cable parameter for BSF-400 is minimum 1,5mm<sup>2</sup> / 15,4 AWG.

There is no minimum requirement for drawing power.

### 12.5.1 Power Unit BPS-405

The inputs for the battery and the charger are specified to handle up to 10A. The fuses, F7 battery and F8 Charger, shall have 5A fuses.

Batteries that are to be used with BSF-400 are Fiamm batteries with the maximum size of 18Ah. The minimum size of batteries if batteries are connected is 7,2Ah.

The maximum current that may be drawn from the batteries when the primary power source is disconnected is 5A for BPS-405.

There is no minimum requirement for drawing power. The maximum power that may be drawn from BPS-405 is 3,5A.

I max A	Maximum battery current output when mains disconnected	Fuse F7: Charger, Battery
3,5A	5A	T5AH

The maximum internal resistance for a battery connected to a BSF-400 is 0,8Ω, any higher resistance than this will be detected as a fault in the battery by BSF-400.

#### NOTE:

If power to the system is supplied exclusively from the batteries (in case of a power supply failure), and the voltage is below 19V, the Power Board BSF-400 will perform a controlled shutdown (i.e. the power is switched OFF).

## 12.5.2 Power Unit BPS-410

The inputs for the battery and the charger are specified to handle up to 10A. The fuses, F7 battery and F8 Charger, shall have 10A fuses.

Batteries that are to be used with BSF-400 are Fiamm batteries with the maximum size of 18Ah. The minimum size of batteries is 12Ah.

The maximum current that may be drawn from the batteries when the primary power source is disconnected is 10A for BPS-410.

The maximum power that may be drawn from BPS-410 is 8A.

I max A	Maximum battery current output when mains disconnected	Fuse F7: Charger, Battery
8A	10A	T10AH

The maximum internal resistance for a battery connected to a BSF-400 is 0,6Ω, any higher resistance than this will be detected as a fault in the battery by BSF-400.

### NOTE:

**If power to the system is supplied exclusively from the batteries (in case of a power supply failure), and the voltage is below 19V, the Power Board BSF-400 will perform a controlled shutdown (i.e. the power is switched OFF).**

## 12.6 Battery Charging

The charging voltage is temperature controlled, so optimal charge for each temperature is maintained.

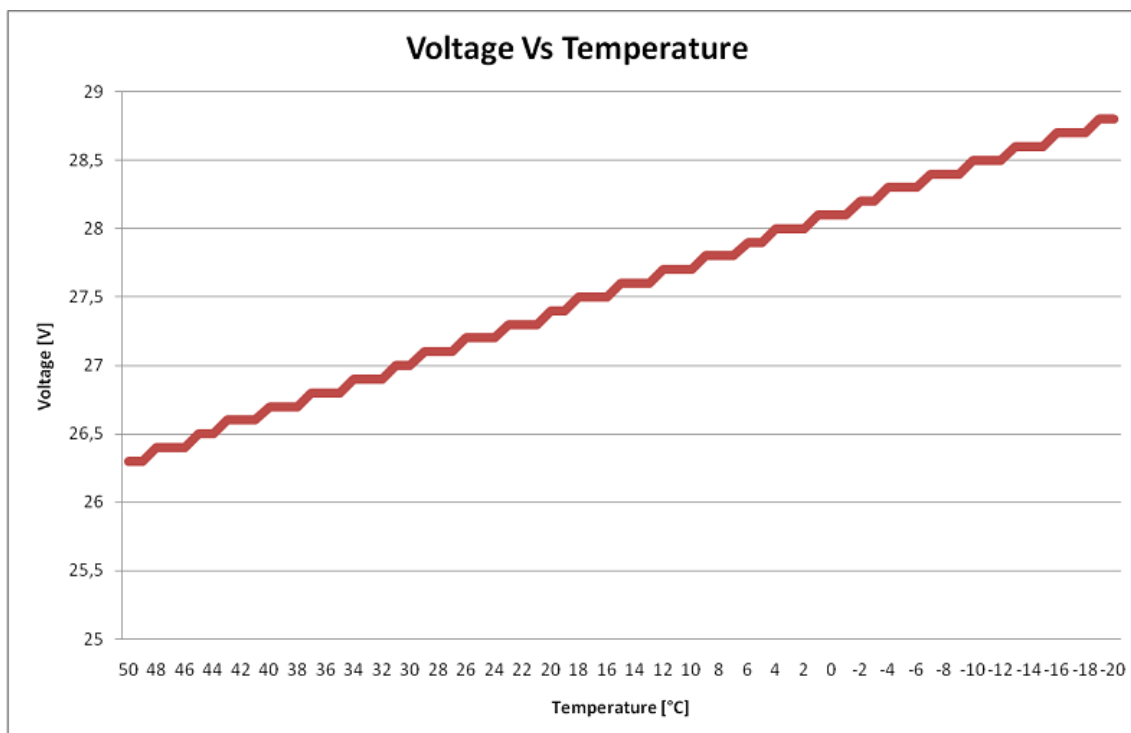
Charge current for the BPS-405 is also controlled, so that the charging voltage will decrease when the charge current reaches 2A.

A "Battery voltage too low"-warning will display on AutoSafe systems connected to the BPS-405 or BPS-410 via AutoFieldBus. The message will clear when charge current drops below 400mA.

Attention: The battery temperature sensor must be placed on the batteries. If the sensor is placed in warmer or colder places, the charging voltage will be wrong, and lower battery capacity and/or shorter battery life may be expected.

The charging voltage at 25°C is 27, 2 V DC.

Note that when the BSF-400 board is turned OFF and batteries are connected to the battery termination, the leak current of the batteries is 6mA.



Note that the charging voltage versus temperature graph above shows approximate values only and will vary depending on the type of power supply that is used. The graph is an example for BPS-405.

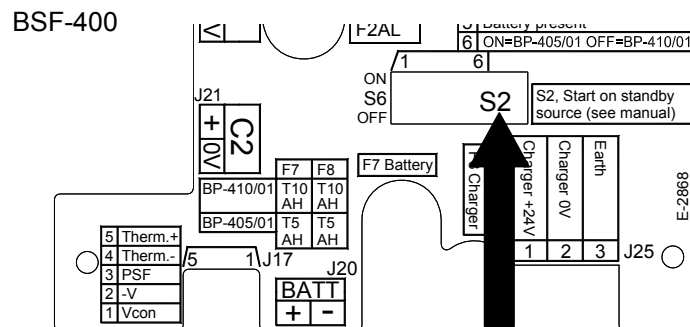
## 12.7 Button S2 – Start on S2 on Standby Source

By pressing button S2 one second, the system can be started (without mains source) from the battery when the battery voltage is >20V DC.

Note that, if the battery voltage is less than 20V DC, the button will have no effect (hardware controlled).

Troubleshooting:

In some cases the voltage can be slightly above 20V DC and drop rapidly to below 20V DC. The relay will then tend to chatter. In this case, it is recommended that the system is not started until the battery is fully charged.



S2:  
Start on  
standby source

## 12.8 Configuration Settings

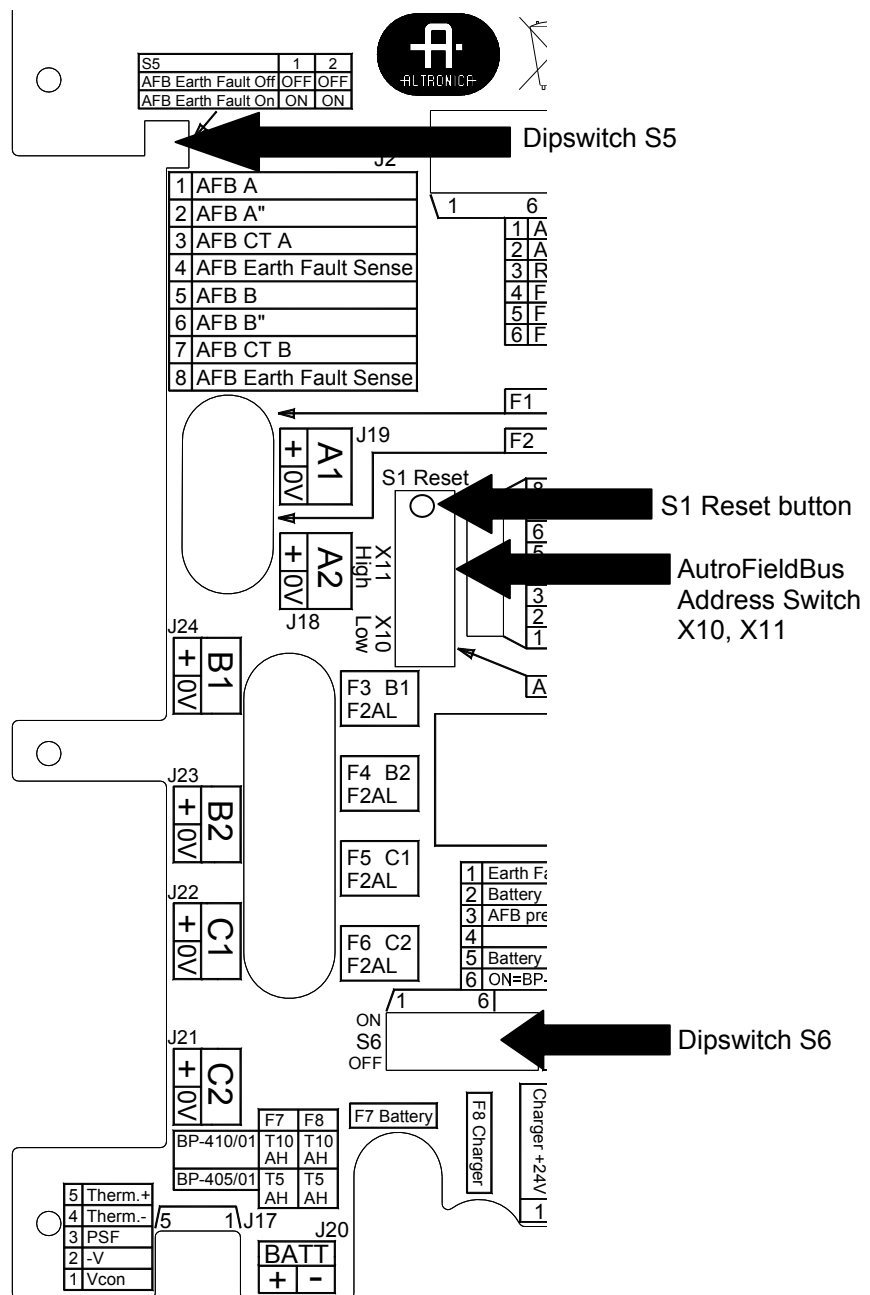
The BSF-400 board may be used in several different configurations. The board is configured by means of two switches:

- Dipswitch S5 and S6 (refer to dipswitch tables, 12.9)
- Rotary switches X10 and X11 - AutoFieldBus address switch.

Each Power Board is given a unique address.

If for any reason the settings on dipswitch S6, X10 or X11 have been changed, the BSF-400 must be restarted by pressing the reset button S1 for this change in order to be taken into account.

The power has two modes of user interaction; standalone (S6.3 OFF) or with communication to the AutoSafe system.





## 12.9 Dipswitch table – S5 and S6

Dipswitch table – S5

S5.1	S5.2	Function
OFF	OFF	AutroFieldBus earth fault OFF
ON	ON	AutroFieldBus earth fault ON

Dipswitch table – S6

Switch	Name	Comment
S6.1	Earth Fault	ON: Earth fault monitoring activated OFF: Earth fault monitoring deactivated
S6.2	--	NA
S6.3	AutroFieldBus	ON: AutroFieldBus connected OFF: AutroFieldBus not connected
S6.4	Not used	NA
S6.5	Battery	ON: Battery connected OFF: Battery not connected
S6.6	Power Unit Type	ON: BPS-405 OFF: BPS-410

## 12.10 Connectors

Connector	Description	BPS-405 / BPS-410
J25	Power Supply	To BSP-405 (Mean Well Power Supply)
J20	Battery connector	To Battery 27,3VDC charging
J17	Temp. sensor/Mean Well Control	Applies to BPS-405 only. Temperature sensor (close to battery) and Mean Well PSU (1-3) from power, (4-5) temp. sensor
J26 1-3	Powernet control	Applies to BPS-410 only. Control wires for power supply.
J26 4-6	Fault Relay	Applies to both BPS-405 and BPS-410. Fault Relay (NO, NC, com) Fault output.
J19	Output A1	24V/2A (BSA-400 $V_{in1} \pm 0V$ )
J18	Output A2	24V/2A (BSA-400 $V_{in2} \pm 0V$ )
J24	Output B1	24V/2A, general power output
J23	Output B2	24V/2A, general power output
J22	Output C1	24V/2A with interrupt at init
J21	Output C2	24V/2A with interrupt at init

The power outputs have different properties. They can all deliver 2A each (limited by total power available).

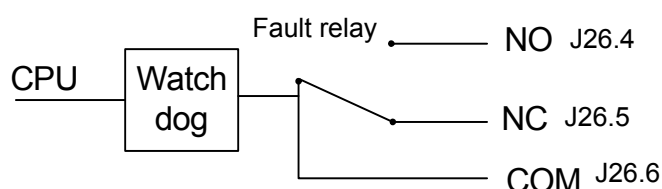
Output	Description
Output A	These will always be ON. Will be turned OFF by a short-circuit only.
Output B	These are initially ON, but may be switched OFF/ON from AutoSafe.
Output C	These will be turned OFF during start-up of BSF-400 (initialization). May be switched OFF/ON from AutoSafe. Power to I/O modules.

## 12.11 Fault Relay Watchdog J26

The fault relay on the BSF-400 board has its own watchdog. If the CPU stops for any reason the watchdog will turn over the fault relay if it is not fed within 1 second.

If for any reason the BSF-400 restarts, it takes 5 seconds before the fault relay is in the correct position:

- J26.4 (normally open contact): closed contact when the unit is not supplied with power or there is a fault on the unit
- J26.5 (normally closed contact): closed when no faults exist
- J26.6 (common): common for fault relay



Note that the fault relay will not be turned over for communication faults on the AutoFieldBus.

The green and red LED beneath the cover are indicators for AFB-RX and – TX. Heartbeat is indicated when these LEDs are blinking simultaneously. Rapid blinking indicates heavy traffic on the AutoFieldBus. If the red LED is weak and the green one is not lit, there is no communication between the BSF-400 board and the AutoFieldBus.

LED number / Colour / Schematic reference	Mechanic name (E-2868)	Description
1. Green	Power ON	This LED signifies that the BSF-400 has power and will be OFF for 20 ms every second.
2. Yellow	Mains Fault	Will blink if power supply lacks 230V AC connection.
3. Yellow	Battery Fault	Blinking LED; for all battery faults, except when a battery fuse is blown
4. Yellow	Fuse Fault	Blinking LED for all fuse faults and also for all electronic fuse faults.
5. Yellow	AutoFieldBus Com	The LED is lit shortly if AutoFieldBus communication is received or transmitted.
6. Yellow		For future use.
7. Red	General Fault	Blinking LED if there are one or more faults in the power supply system.
8. Yellow	Internal Fault	Blinking LED if there exist one or more internal faults on the BSF-400. This includes temperature on the BSF-400 out of bounds. Internal faults are mostly PCB errors. This LED blinks in a much faster cycle than the others.

All blinking LEDs, except where otherwise stated, will blink with 0,5 seconds ON and 0,5 seconds OFF.

## 12.12 Battery Resistance Measurement

Every fourth hour, battery impedance measuring is conducted.

This is conducted by lowering the PSU voltage so that all loads are powered from the batteries for a period of 60 seconds, then a built in resistor is turned ON for 2 seconds. BPS-405/BPS-410 will then measure the voltage increase between the resistor ON and OFF and thus calculate the battery resistance. This measurement includes the wires to and from the battery.

The battery high resistance fault is given when the total resistance of the battery and battery cables is:

Type	Resistance
Power Unit BPS-405	0.8Ω
Power Unit BPS-410	0.6Ω

- If such a fault is given, check the cable resistance or replace the batteries.

## 12.13 Electronic fuses

### 12.13.1 Power outputs

Power outputs A1, A2, B1, B2, C1 and C2 are protected by both electronic and regular fuses. The electronic fuses will trip if a current between 3.5A and 7A is drawn. The electronic fuse will turn OFF power within approx. 10ms of a short circuit. The BSF-400 will try to turn ON power 3 times with ~50s interval between each try.

If an external fault is not resolved, BSF-400 will not try to re-power more than 3 times. A reset on an AutoSafe panel or pushing reset button S1 will force the BSF-400 to retry.

**IMPORTANT:**

To be safe, remove regular fuse before troubleshooting external faulty equipment.

### **12.13.2 Battery Input**

The battery input is protected by an electronic short-circuit detector and a regular fuse. If a short circuit is detected, the battery relay will turn OFF within approx 50ms. The AutoSafe AutoFieldBus system will then report "Battery not connected".

## **12.14 Part of an AutoFieldBus Network**

As a part of an AutoFieldBus network, the power module is configured before start-up using dipswitches, some data, for example, "Low voltage"-warning is given from an AutoSafe configuration via AutoFieldBus.

Diagnostic outputs are given onboard with LEDs and alarm relay, and on AutoSafe panels with audible alarms and display messages.

The LEDs and fault relay will not indicate any failure before the AutoSafe has AutoFieldBus connection and the AutoSafe system has been initialized.

## **12.15 Power Unit BPS-405 / BPS-410 as Standalone**

In the standalone system, user input is given during installation only, using dipswitches onboard. Set dipswitch S6.3 OFF to set the power supply in standalone mode.

Diagnostic outputs are given onboard with LEDs and fault relay.

# 13. Cable Specifications

## 13.1 Overview

Cabling	Cable type / category	Cable dimension	Maximum cable length (m)	Maximum resistance ( $\Omega$ ) / capacitance (F)
<b>AI_Com Fire Detection Loops</b>	2 x 0,75	18 AWG	1000m	<i>Standard</i> loop driver module BSD-310: $R_{max}=50\Omega$ total and $C_{max}=0,5\mu F$
	2 x 1,5	15 AWG	2000m	
	2 x 2,5	13 AWG	3300m	
	2 x 0,75	18 AWG	400m	<i>High-power</i> version BSD-311: $R_{max}=20\Omega$ total and $C_{max}=0,5\mu F$
	2 x 1,5	15 AWG	800m	
	2 x 2,5	13 AWG	1320m	
	In Integrated Fire & Gas Detection Systems, shielded cable is recommended.	CSA 1.0mm <sup>2</sup> (Cross Sectional Area in square millimetres)		
<b>PowerLoop</b>	Dual shielded cable, twisted pair cables shall be used.	The Power Loop Calculator Tool shall be used to determine the cable dimension. Typically CSA 2,5mm <sup>2</sup>	1000m. The PowerLoop Calculator Tool shall be used to determine the permissible cable length. Dual shielded cable shall be used.  Long parallel PowerLoop cable runs may introduce cross-talk between PowerLoops, thus it is recommended to avoid such long parallel runs. The permissible length of parallel PowerLoop cable runs will depend on the quality of the cable shield. Segregation of parallel PowerLoop cable runs by 30cm (1 feet) will increase permissible parallel length significantly. Contact Autronica for design-advice for applications with long parallel PowerLoop cable runs.	Maximum loop resistance depends on load.  The PowerLoop Calculator Tool shall be used to determine the maximum resistance.

Cabling	Cable type / category	Cable dimension (mm <sup>2</sup> )	Maximum cable length (m)	Maximum resistance (Ω) / capacitance (F)
<b>AutroFieldBus (AFB)</b>	Twisted-pair cables. Category 4, 5 or 6 For example, ABB art. no 10892 30 CAT.5 FTP 4x2/0.5mm <sup>2</sup> Fibre, SGL/Multimode  Shielded cable required.		Short length cables (< 600m): The cable length is limited to 600m. Capacitance per 1000m shall be less than 200nF.  Medium length cables (< 1000m): The AutroFieldBus cable length is limited to 1000m. Capacitance per 1000m shall be less than 100nF.  Cable length > 1000m: Boosters shall be used if the AutroFieldBus cable is more than 1km in length. Boosters shall be evenly spread round the AFB ring. NOTE: The maximum length for a total ring with Boosters is 2,8km (see also rightmost column).  The booster can also be used in cases when different cable types (AFB cables) are used in a distributed system (see also rightmost column).	Characteristic impedance 100 ohm +/- 15%. Attenuation @100KHz, Max. 9 dB over full cable segments (or between boosters).  Attenuation is defined by the wire to wire capacitance mostly, as long as the wire is at least 0.5mm <sup>2</sup> . The total attenuation of the cable length shall not exceed 9 dB. If attenuation is not specified, normally the capacitance is defined. The capacitance shall not exceed the specified value in order to achieve the total communication length.
<b>Ethernet – TCP/IP (AutroNet)</b>	CAT 5 or 6 / FTP Shielded cable required in maritime installations.		Maximum 100m.	
	Singlemode optic fibre		Transmission length 36000 m (glass fibre with F-G 9/125 0.36 dB/km 32000 m (glass fibre with F-G 9/125 0.4 dB/km 26000 m (glass fibre with F-G 9/125 0.5 dB/km	
	Multimode optic fibre		Transmission length 11000 m (glass fibre with F-G 62.5/125 0.7 dB/km F1000 6400 m (glass fibre with F-G 50/125 0.7 dB/km F1200 3000 m (glass fibre with F-G 62.5/125 2.6 dB/km F600 2800 m (glass fibre with F-G 50/125 1.6 dB/km F800	
<b>AutroCom Serial</b>	CAT 4, 5 or 6.		RS-232: Maximum 10m. RS-4xx: 1000m.	
<b>Third party detectors (RS-485 /RS-422), VDR and ESPA</b>	CAT 5 communication cable or similar.		Maximum cable length 1000m - depending on the cable quality and baud rate.	As for AFB.
<b>Modbus and Profibus Compatible Equipment</b>	CAT 5 communication cable or similar.		Maximum cable length 1000m - depending on the cable quality and baud rate.	As for AFB.
<b>Power Supply / Cabling</b>		Cable dimension according to system load and project spec.		

## 13.2 Switches – Cable Length

### 13.2.1 Twisted Pair

Type indication	Cat5e/Cat6 FTP
<b>Unmanaged</b>	
FL SWITCH SFNT 5TX	100m
FL SWITCH SFNT 8TX	100m
FL SWITCH SFNT 4TX/FX	100m
FL SWITCH SFNT 7TX/FX	100m
<b>Managed</b>	
FL SWITCH LM 5TX	100m
FL SWITCH LM 8TX	100m
FL SWITCH LM 4TX/FX	100m
FL SWITCH LM 4TX/2FX	100m
FL SWITCH LM 4TX/FX SM	100m
FL SWITCH LM 4TX/2FX SM	100m

### 13.2.2 Multi-mode Fibre

Patch cables should be of same specification as main cable.

Type indication	F-G 50/125 0,7 dB/km F1200	F-G 50/125 1,6 dB/km F800	F-G 62,5/125 0,7 dB/km F100	F-G 62,5/125 2,6dB/km F1000
<b>Unmanaged</b>				
FL SWITCH SFNT 5TX				
FL SWITCH SFNT 8TX				
FL SWITCH SFNT 4TX/FX	6,4	2,8	11	3
FL SWITCH SFNT 7TX/FX	6,4	2,8	11	3
<b>Managed</b>				
FL SWITCH LM 5TX				
FL SWITCH LM 8TX				
FL SWITCH LM 4TX/FX	6,4 km	2,8 km	11 km	3 km
FL SWITCH LM 4TX/2FX	6,4 km	2,8 km	11 km	3 km
FL SWITCH LM 4TX/FX SM				
FL SWITCH LM 4TX/2FX SM				



### 13.2.3 Single-mode Fibre

Patch cables should be of same specification as main cable

Type indication	F-G 9/125 0,36 dB/km	F-G 9/125 0,4 dB/km	F-G 9/125 0,5dB/km
<b>Unmanaged</b>			
FL SWITCH SFNT 5TX			
FL SWITCH SFNT 8TX			
FL SWITCH SFNT 4TX/FX			
FL SWITCH SFNT 7TX/FX			
<b>Managed</b>			
FL SWITCH LM 5TX			
FL SWITCH LM 8TX			
FL SWITCH LM 4TX/FX			
FL SWITCH LM 4TX/2FX			
FL SWITCH LM 4TX/FX SM	36 km	32 km	26 km
FL SWITCH LM 4TX/2FX SM	36 km	32 km	26 km

# 14. System Shielding and Earthing

---

The shielded cable shall be connected to the instrument earth (IE) at one end and left floating at the other end.

## 14.1 Definitions

### Local Frame Earth

The electrical connection to the framework at the described physical position, such as the frame or chassis of a cabinet, the power cable outlet etc.

### Shield

Conductive structure encapsulating the wire in a harness or cable, normally in the form of a mesh or foil forming a Faraday cage.

### Armour

Mechanical protection to avoid physically damaging electrical cables or circuits.

### Instrument Earth (IE)

An earth reference that is normally used to reference measurements of electrical signals. It may be the same as the Protective Earth (single earthed systems).

### Protective Earth (PE)



An earth reference that is normally used as a coupling path for unwanted electrical signals, like transients and over-voltage. The chassis or framework of the installation is normally considered to be the local Protective Earth. As the name implies, it is intended to provide a safe electrical potential for human safety.

### Earth

Synonym for Earth, in this handbook Earth is used.

## 14.2 Single Earth Systems - PowerLoop

Firstly, consider a Single Earth system for simplicity.

Please note that an Integrated Fire and Gas system with PowerLoop shall by no means be designed as a single earth system. Refer to section **Feil! Fant ikke referansekinden.** for details about keeping the PowerLoop as a dual earth system.

1) All PowerLoop cabling shall be shielded.

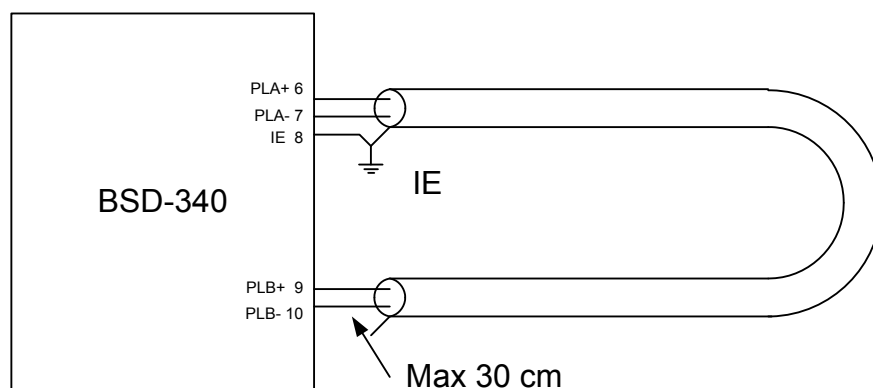
Every segment of the PowerLoop cable has to be protected by a shield that effectively attenuates the radiated field from the cable.

The shielding is required to avoid radiated emissions and hence crosstalk from one PowerLoop to any other. Armouring is normally not considered to be a sufficient shield.

2) Shield shall be terminated at one end only.

The shield shall be terminated close to the BSD-340 PowerLoop Driver. As the cable forms a full loop, the return path of the cable shield shall not be terminated. No electrical connection to earth shall be made anywhere in the system, i.e. the units shall be installed and galvanically isolated from the chassis.

The termination of the shield will be defined by the site installation, to a earth terminal in the cabinet or similar.



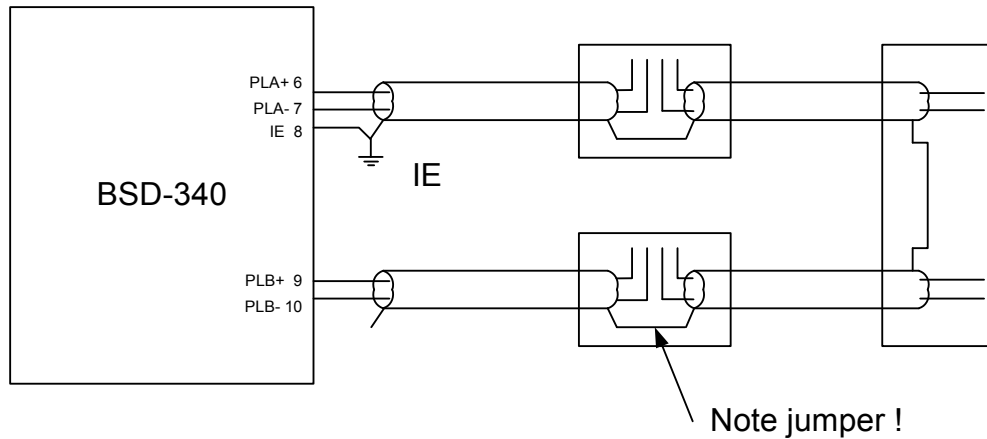
3) Maximum permissible non-shielded length of cable - 30 cm

This implies that the internal cabling in a rack or enclosure where the BSD-340 and / or the Loop Units are installed also needs to be fully shielded. The requirement includes termination / junction boxes and all field wiring as well.

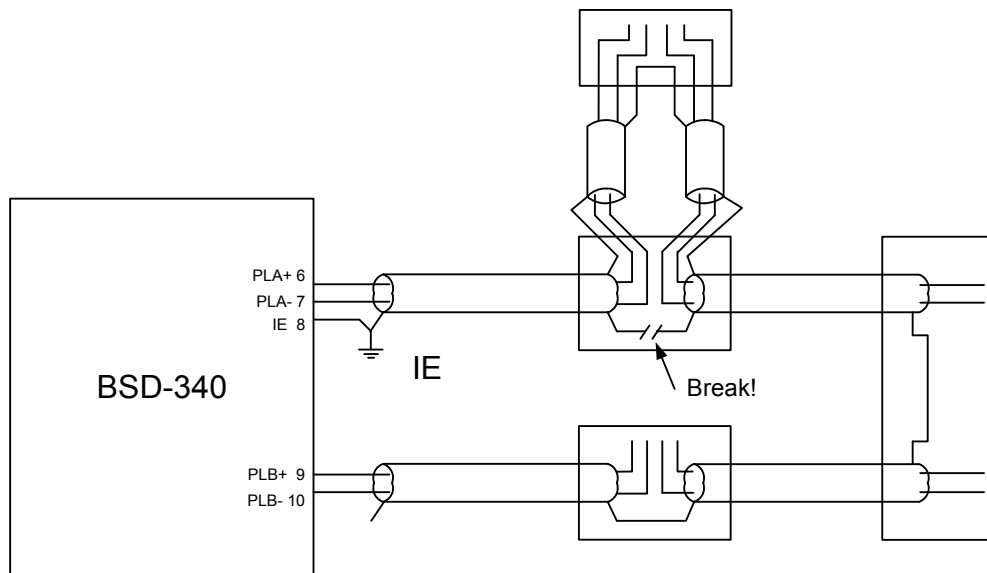
#### 4) Shield shall be continuous

The PowerLoop cable will be split in two segments, separated by field equipment including junction boxes or Loop Units. The shield shall be continued through these separations. There shall be no electrical connection to the local frame earth.

In the following figure the junction boxes includes a strap / jumper to continue the shield between the cable segments (these straps / jumpers should be made of a suitable low-impedance cable).



If there are break-outs from the main loop (to make local small loops that return to the same break-out box), care shall be taken to avoid local closed loops. See the figure below.

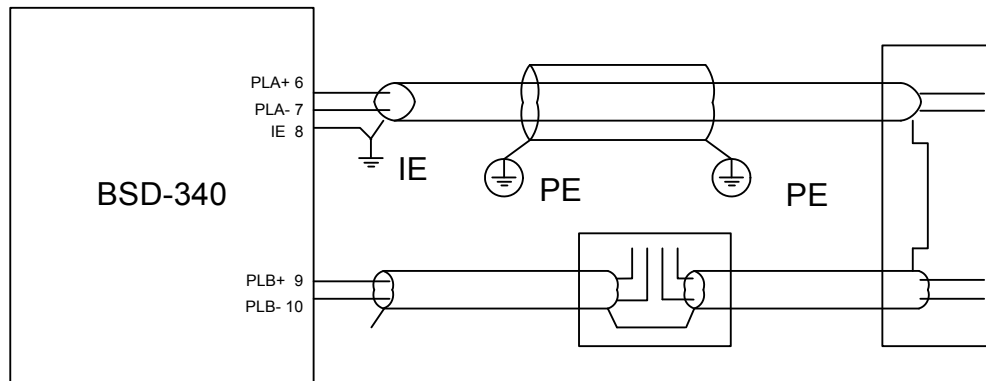


#### 5) Maximum cable length

The PowerLoop Calculator will define the maximum length of each cable segment, this tool however determines length only from the power loss of the specified cable. The cable or wire capacitance will not affect the cable length as much as the resistive loss will restrict the power, not the communication.

## 14.3 Dual Earth Systems - PowerLoop

Power Loop installations use both Instrument Earth (IE) and Protective Earth (PE) as two separate earthing paths. In this case, the shield (inner layer of cable) shall be continuous and earthed at one end only. The outer braid, shield or armour, is then connected to the Protective Earth connection. This will normally be the local connection point to the PE, the chassis of the cabinet or a chassis connection close to the field equipment. The two earth systems shall be kept isolated.

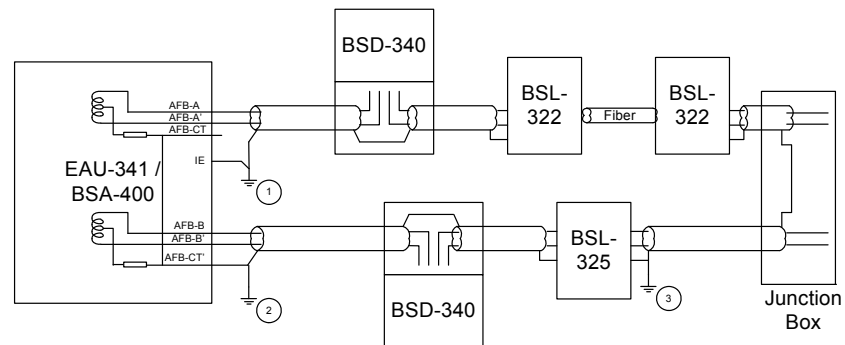


PE will make earth loops as they are terminated at multiple points, however the loop area will be narrow or closed as the armour will be close to the frame or earth. It is essential that the armour is kept on the same equipotential around to avoid EMC problems or large current flow in the PE. PE may be connected through glands to the junction boxes to form a continued protective armour or shield. Still the internal shield and IE shall be kept isolated from the PE.

## 14.4 Shielding and Earthing AutoFieldBus

A description of the local earthing requirements for each unit that may be connected to AutoFieldBus is included in the respective datasheets. In the total system overview, some key issues need to be taken care of:

- Shielded cable is recommended. There are no absolute requirements for shielding, however if severe electromagnetic interference is expected, shielding should be applied. Unshielded cable may be used inside the cabinet.
- If shielded cable is used, the shield shall be kept continuous. Care should be taken to avoid earth/shield loops. As a guideline, connect the shield to the B-side of the Controller Board BSA-400 and not to the A-side.
- If segments of the AutoFieldbus cable are isolated, as it will be when including BSL-325 Booster, BSL-321 Multimode Fiber or BSL-322 Single Mode Fiber, local earthing of the isolated segments is required. See figure for example. We follow the cabling counter-clockwise:



The cable shield is referenced to earth at Earthpoint 2 according to the guidelines above. Through the BSD-340 the shield is continued. There's a galvanic isolation in the Booster (BSL-325) that makes the cable (on the right side) floating. To avoid this, the Center Tap of the transformer of the AutoFieldBus (internal in the BSL-325) is terminated to the local Earth at Earthpoint 3.

An alternative is to rather bring the reference from the other side of the Booster across it, to continue the shield in that way. Note that the bus needs to be referenced by connecting the CenterTap (pin 3 or 6) to Earth. On the left side, this is ensured by the AFB-CT to Earth at the EAU-341 / BSA-400, while the BSL-325 right side needs to be tied to Earth or to the reference of its left side, by for instance connecting pin 3 to 6.

Further on, the BSL-322 to BSL-322 also isolates. If there had been several fiber jumps, each individual cable segment between the fiber segments would have to be earthed. In this case, the segment following passes through a BSD-340, the shield is kept continuous and it is referenced to Earth at Earthpoint 1, close to the EAU-341 / BSA-400. An alternative to this would be to terminate at the other end of this segment, at the BSL-322.

The main rule is: Ensure that all segment's shield are terminated at one end and one end only.

Dual Earth systems acts similar to the description of the PowerLoop, as long as the inner Instrumental Earth shield is kept according to the above rules, the outer protective shield may be terminated at multiple locations.

## 14.5 Earth Fault Detection - AutoFieldBus

The Earth Fault detection mechanism monitors the cable segment that is electrically connected to the Controller Board BSA-400. However, if the cable is interrupted electrically by a BSL-325 Booster or a Fibre modem, these segments may need additional Earth Fault Monitoring. This may be achieved by including a BSD-321 into this segment, and enable the Earth Fault Monitoring at this device.

Care shall be taken to avoid two units monitoring the same segment, as they may interfere with each other on this feature.

All earth fault monitoring is done towards Instrument Earth (IE) in the units.

## 14.6 Fault Finding Guidelines - Earth Faults

### 14.6.1 Earth Fault to Plus or Minus

Earth fault to plus or minus is an indication that there is a short circuit in the system between plus or minus and the earth.

For a normal system the Earth voltage level is floating between plus and minus in order to be able to monitor an earth fault. If you measure between the battery minus and earth on a healthy system, you will find a difference on 3-5V. The plus terminal and earth will have a difference of approximately 22-25 V (the charger load is 27 V DC).

In the event of an earth fault to plus, the positive terminal is shorted to earth. In this case the voltage difference between the positive battery terminal and earth will be close to zero.

The easiest way to locate the problem area is to disconnect parts of the system while keeping a voltmeter connected between the positive battery terminal and earth. When the problem area is disconnected, the voltmeter reading will immediately revert to normal voltage (between 22-25V DC).

Such faults are most likely to occur on one of the detection loops.

- Start by simply disconnecting the loops one by one, while observing the voltmeter.
- If there is no difference, try to disconnect other 24V consumers fed by the system (voltage to flame detectors, door magnets, bells outputs etc)

If the system still has this fault after all external wires are disconnected, the problem is either on the main board itself, the batteries or the power supply.

- To check the batteries, use the voltmeter to measure between the positive terminal of the BSS-103A power supply (Terminal 7) and earth, then take away both battery fuses.
- If the problem is on a detection loop, leave this loop disconnected from the loop driver, then remove one detector head from this loop.
- Use a regular ohm-meter to measure the resistance between the positive wire (terminal 1 or 2) and earth in the socket (Note: Do NOT use a megger, as this will damage the detectors on the detection loop).
- Note the resistance value you find, then re-place the detector head.
- Move to another detector on the detection loop, and perform the same measurement.
- If the resistance value increases, you are moving away from the problem area on the detection loop, if it decreases you are moving towards the problem area.

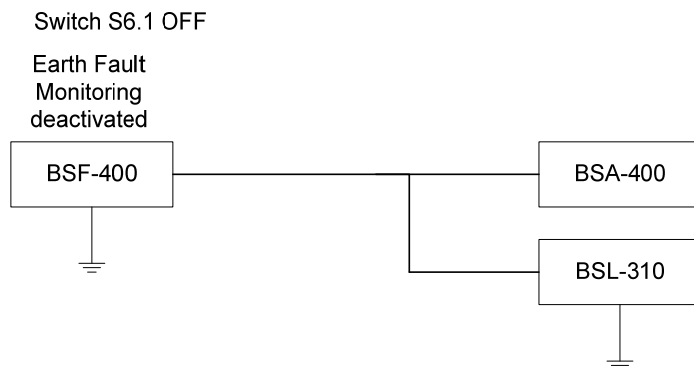
By using these observations, it should be possible to get an idea of the problem area, and then check the wiring in this area to locate the problem.

## 14.6.2 Examples of Earth Faults

### Example 1

In this example there is only one earth fault detection zone. The earth fault monitoring for the BSF-400 must be switched off so it does not interfere with the BSL-310 earth fault detector, as these use different earth voltage potentials. If there is an earth fault present in this system the whole system must be searched to find the earth fault.

### Example 1



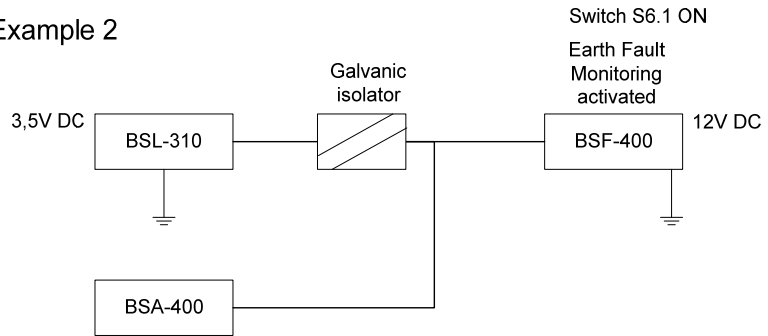


---

## Example 2

In this example, both the BSL-310 and BSF-400 will monitor for earth faults. This will divide the installation into two separate earth fault zones with different earth potential; 3,5 VDC and 12 VDC. Any fault detected by the BSL-310 will be located on the same side of the galvanic isolator as BSL-310, and vice versa for BSF-400.

### Example 2



# 15. Service and Maintenance

## 15.1 Fault messages Power Board BSF-400

Fault category: Power		
Fault message	Cause	Remedy
BSF-400 – Power supply fault General Fault LED blinking	Power supply OK, but power supply cable(s) unplugged	Re-insert power supply cables
	Power supply malfunction	Replace Mean Well or Power Box PSU unit.
BSF-400 – Mains fault Mains Fault LED blinking General Fault LED blinking	Mains is disconnected, loss of power from mains source	Re-insert mains plug, check mains power source
	Mean Well PSU control cable is disconnected/broken	Re-insert or replace control cable.
BSF-400 – Battery not connected Battery Fault LED blinking General Fault LED blinking	Battery is disconnected	Re-connect battery
	Battery is short circuited	Remove short circuit
BSF-400 – Battery fuse blown Fuse Fault LED blinking General Fault LED blinking	Battery fuse is blown	Replace with appropriate fuse
BSF-400 – Battery temperature sensor open circuit Battery Fault LED blinking General Fault LED blinking	Battery temperature sensor cable is disconnected or broken	Replace battery temperature sensor cable
BSF-400 – Battery temperature sensor short circuit Battery Fault LED blinking General Fault LED blinking	Battery temperature sensor cable is short circuited	Remove short circuit
BSF-400 Output [A1/A2/B1/B2/C1/C2] electronic fuse blown Fuse Fault LED blinking General Fault LED blinking	A short circuit or very high current draw has occurred on power output.	Warning: BSF-400 will try to re-power automatically. Remove corresponding fuse before working with faulty external equipment. Remove short circuit and press reset on AutoSafe panel to reset electronic fuse.
BSF-400 Output [A1/A2/B1/B2/C1/C2] fuse blown Fuse Fault LED blinking General Fault LED blinking	The fuse is blown.	Replace with appropriate fuse
BSF-400 Output [A1/A2/B1/B2/C1/C2] voltage to low. General Fault LED blinking	This may occur when running on battery only and battery voltage is below 18V.	Insert mains to charge batteries.
	This warning may occur when a fuse is removed from an output with no load.	Accept fault in AutoSafe.

Fault category: Power		
Fault message	Cause	Remedy
BSF-400 Battery Relay Fault	This warning may occur during start-up if a battery is not connected	Connect battery, or put dip switch 5 to OFF position if no battery is to be used
	The relay fault warning may occur if there is a hardware fault.	Replace BSF-400 board.
BSF-400 Battery voltage to low	This message may occur under start-up when battery voltage is to low, i.e. charging current is >1100mA.	Message will clear when charge current drops below 400mA.

## 15.2 Service and Maintenance

The AutoSafe Interactive Fire Alarm System provides a Log Menu, which records all system events, i.e. fire alarms, prealarms, faults, enablements/disablements, user operations and tests.

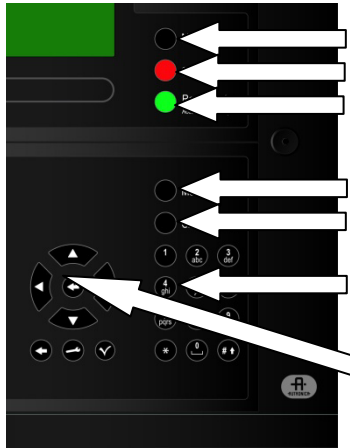
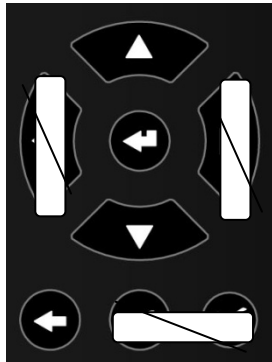
It is the system owner's or authorized personnel's duty to register all events in a Control Journal.

### 15.2.1 Monthly Maintenance

Step	Description	✓
<b>1</b>	Look through the log journal to find any possible irregularities.	
<b>2</b>	Make sure that possible changes in the building structure or storage environment have not affected the detectors' capability to detect a potential fire.	
<b>3</b>	Make sure that the detectors are not covered with paint or contaminated with dust or dirt. Check the log for contaminated detectors (Service/Log menu).	
<b>4</b>	Perform a visual inspection of the panels/cabinet.	
<b>5</b>	Perform a simple test of display and panel functions	
<b>6</b>	Test the sounders.	

## 15.2.2 Annual Service and Maintenance

The whole system (control panel, detectors, control functions) should be inspected annually. An annual service inspection comprises the following:

Step	Description	✓
<b>1</b>	To test the panel indicator lights and internal buzzer, press and hold the Reset button for at least 5 seconds. All indicators are lit and the buzzer is turned on. The test will automatically stop. The lamp test can be performed in access level 1 (no use of key).	
<b>2</b>	<p>Test all operating keys by pressing each key (refer also to Operator's Handbook): All buttons will give a short "Beep" when pressed, except Mute button, Menu button and Reset System button (plus the ones that are not supported, see below).</p>  <p>Note that the left/right arrow buttons and the two buttons in the lowermost right hand corner (indicated with a white line) are not yet supported:</p> 	
<b>3</b>	Perform a visual and functional inspection of manual call-points and automatic detectors. Check the log for contaminated detectors (Service/Log menu).	
<b>4</b>	Disable any alarm transference to the Fire Alarm Routing Equipment -FARE output.	
<b>5</b>	Activate the alarm system. Test all sounders by activating an alarm from a corresponding manual call-point.	
<b>6</b>	Test all control functions.	
<b>7</b>	Activate alarms from at least one detector/manual call-point in each zone and a check that all respective outputs are activated.	
<b>8</b>	Test the action of any auxiliary operating functions (disabling, cancelling and resetting buttons).	
<b>9</b>	Check the alarm transference outputs by connecting from outgoing outputs (potential free relay and 24V output) activated by alarm in a zone.	

Step	Description	✓
<b>10</b>	Check the fault warning function from detector zones by removing a detector in each zone. Activate a fault (remove battery fuse) and observe: <ul style="list-style-type: none"> <li>- the <i>Fault</i> indicator starts to blink</li> <li>- a fault warning is displayed</li> <li>- the internal buzzer is turned ON</li> <li>- the Fault Warning Routing Equipment (FWRE) output is activated (if any)</li> </ul>	
<b>11</b>	Verify all <i>conditions</i> , i.e.: <ul style="list-style-type: none"> <li>- Fire Alarm condition</li> <li>- Fire Warning condition</li> <li>- Fault Warning condition</li> <li>- Disablement condition</li> <li>- Test condition</li> </ul>	
<b>12</b>	On completion of checks, ensure that only the green "Power" indicator is ON when the panel is in its idle state (normal operation).	
<b>13</b>	Enable alarm transference to the Fire Alarm Routing Equipment -FARE output.	

The battery should be changed every 4 years. If a fault arises on the panel that cannot be rectified, contact your nearest Autronica Fire and Security office for qualified assistance.

## 16. Reader's Comments

---

Please help us to improve the quality of our documentation by returning your comments on this manual:

Title: *Installation Handbook, AutoSafe Interactive Fire Detection System, Release 4,*

Ref. No.: *116-P-ASAFE-INSTALL/DGB Rev. F, 2011-09-14*

Your information on any inaccuracies or omissions (with page reference):

Please turn the page

Suggestions for improvements

Thank you! We will investigate your comments promptly.

Would you like a written reply? ☐ Yes ☐ No

Name: \_\_\_\_\_

Title: \_\_\_\_\_

Company: \_\_\_\_\_

Address: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Telephone: \_\_\_\_\_

Fax: \_\_\_\_\_

Date: \_\_\_\_\_

Please send this form to: Autronica Fire and Security AS  
N-7483 Trondheim  
Norway

Tel: + 47 73 58 25 00

Fax: + 47 73 58 25 01

[www.autronicafire.com](http://www.autronicafire.com)





**Autronica Fire and Security** is an international company, headquartered in Trondheim, one of the largest cities in Norway. The company is owned by United Technologies Corporation and employs more than 319 persons with experience in developing, manufacturing and marketing of fire safety equipment. Our products cover a broad range of systems for integrated solutions, including fire detection systems, integrated fire and gas detection systems, control and presentation systems, voice alarm systems, public address systems, emergency light systems, plus suppression systems.

All products are easily adaptable to a wide variety of applications, among others, hospitals, airports, churches and schools, as well as to heavy industry and high-risk applications such as power plants, computer sites and offshore installations, world wide.

The company's strategy and philosophy is plainly manifested in the business idea:  
*Protecting life, environment and property.*

#### **Quality Assurance**

Stringent control throughout Autronica Fire and Security assures the excellence of our products and services. Our products are CE marked and developed for worldwide standards and regulations, and conform to the CEN regulation EN54. Our quality system conforms to the Quality System Standard NS-EN ISO 9001:2000 and is valid for the following product and service ranges: marketing, sales, development, engineering, manufacture, installation, commissioning and servicing of suppression, integrated fire and gas detection and alarm systems, plus petrochemical, oil and gas instrumentation systems for monitoring and control.

#### **Autronica Fire and Security AS**

**Headquarters, Trondheim, Norway.** Phone: + 47 73 58 25 00, fax: + 47 73 58 25 01.

Head Office Oil & Gas, Stavanger, Norway. Phone: + 47 51 84 09 00, fax: + 47 51 84 09 99.

Division Oil & Gas, Oslo, Norway. Phone: + 47 23 17 50 50, Fax: + 47 23 17 50 51

Division Oil & Gas, PO Box 416, Farnborough GU14 4AT, UK. Phone: + 47 51 84 09 00, Fax: + 44 84 52 80 20 55

Division Maritime, Suppression/New Build Detection & Alarm, Norway. Phone: + 47 31 29 55 00, Fax: + 47 31 29 55 01

Division Maritime, After Sales/Service Detection & Alarm, Norway. Phone: +47-73 58 25 00, Fax: +47-73 58 25 01

Visit Autronica Fire and Security's Web site: [www.autronicafire.com](http://www.autronicafire.com)